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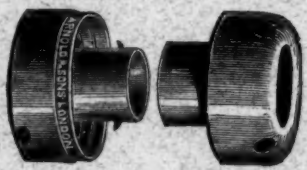

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JULY, 1895.

ON THE RENDERING OF ANIMALS IMMUNE AGAINST THE VENOM OF THE COBRA AND OTHER SERPENTS; AND ON THE ANTIDOTAL PROPERTIES OF THE BLOOD-SERUM OF THE IMMUNISED ANIMALS.*

BY PROFESSOR THOMAS R. FRASER, M.D., LL.D., F.R.S., DEAN OF THE FACULTY OF MEDICINE, UNIVERSITY OF EDINBURGH.

ONE of the most striking and interesting of the many traditions and current beliefs regarding venomous serpents is that a power may be acquired of freely handling them without injury, and even of successfully resisting the poisonous effects of their bites.

The Psylli of Africa, the Marsi of Italy, the Gouni of India, and other ancient tribes and sects, were stated to have been immune against serpents' bites, and to have been able to exercise a remarkable influence over even the most venomous of these animals; and those attributes have been explained on the supposition that serpents' blood was present in the veins of the members of these tribes and sects.

In more modern times, and, indeed, at the present day, the same belief is stated in the writings of travellers; and it has been expressed by poets and novelists, and among the latter, with a half-admitted conviction of its reality, by Wendell Holmes, in his "Romance of Destiny."

In "A New and Accurate Description of the Coast of Guinea," published in 1705, by William Bosman, an account is given of the great "reverence and respect" of the negroes for snakes; in connection with which the following statements are made:—"But what is best of all, is, that these

* Communicated to the Royal Society of Edinburgh, June 3rd, 1895.

idolatrous snakes don't do the least mischief in the world to mankind; for, if by chance in the dark one treads upon them, and they bite or sting him, it is not more prejudicial than the sting of millepedes. Wherefore, the natives would fain persuade us that it is good to be bitten or stung by these snakes, upon the plea that one is thereby secured and protected from the sting of any poisonous snake. But here," he proceeds to remark, "I am somewhat dubious, and should be loth to venture on the credit of their assertions, because I have observed that the gods themselves are not proof against these venomous serpents, much less can they protect us against their bite."

Drummond Hay, in his work on Western Barbary, gives a description of the performances of four members of a sect of snake-charmers, called the Eisowy, who freely handled, and allowed themselves to be bitten by serpents proved to be venomous by a rapidly fatal experiment performed on a fowl. At the termination of the exhibition, the Eisowy, apparently as a usual performance, "commenced eating or rather chewing" a poisonous snake, "which, writhing with pain (to quote Mr. Hay's words) bit him in the neck and hands until it was actually destroyed by the Eisowy's teeth." He states that, on another occasion, at Tangier, a young Moor, who was witnessing the performances of a snake-charmer, ridiculed his exhibition as a delusion, and having been dared by the Eisowy to touch one of the serpents, the lad did so, was bitten by one of them, and shortly afterwards expired. In connection with my subject, a special interest is attached to the account given by Mr. Drummond Hay, and repeated in its main features by Quedenfeldt in the *Zeitschrift für Ethnologie* of 1886, of the origin of this Eisowy sect, and of the immunity which they claim. The founder, Seedna Eiser, was being followed through the desert of Soos by a great multitude, who, becoming hungry, clamoured for bread. On this, Seedna Eiser became enraged, and turning upon them he uttered a common Arabic curse which means "eat poison." So great was their faith in the teaching of the saint, that they acted upon the literal interpretation of his words, and thereafter ate venomous snakes and reptiles; and from that time they themselves and their descendants have been immune against serpents' bites.

In the writings of many other travellers similar evidences may be found of a belief in the possession of a power successfully to resist the poisonous effects of serpents' bites. The same belief presents itself in the conviction, prevailing in

several parts of the world, that a non-fatal bite by a poisonous serpent, provided marked symptoms have followed, confers protection against subsequent bites ; and in the tales of the performances by the snake.charmers of the present time. These performances have been graphically described, among others, by Hooker and Ball in their *Journal of a Tour in Morocco and the Great Atlas*, but only to be dismissed as impostures, rendered possible by the previous extraction of the poison-fangs, or by some other disabling operation. Although, possibly, the performances are at times, or even frequently, impostures, it almost appears as if this conclusion were arrived at more because of their improbability and their apparent defiance of knowledge regarding the effects of serpents' venom, than because of satisfactory or sufficient proof having been obtained of the conclusion. Some of the facts which I shall bring before the Society will, on the other hand, show that this conclusion can no longer be justified on the ground that the asserted facts imply impossibilities.

It may be instructive to associate with this belief in the possession, under certain conditions, by human beings of a power successfully to resist the poisonous effects of serpents' venom, and with the evidences in its support, the further belief that venomous serpents are themselves protected against the effects of bites inflicted upon them by individuals both of their own and of other species. On mere anatomical grounds it is difficult to understand how serpents could escape the absorption of their own venom through mucous surfaces, even admitting that absorption of venom does not occur in normal conditions of these surfaces. Venom must, however, be so frequently introduced into their bodies, in situations where absorption could not fail to occur, by the bites inflicted upon them by other serpents, that the conclusion seems inevitable that they possess some protective quality, without which, probably, no venomous serpents would now be in existence. Not only have many general observations been made in support of this belief, but it has been proved to be correct by direct experiments, such as those made by Fonatana of Tuscany, more than a century ago, and by Guyon, Laçerda, Waddell, Kaufmann, and Sir Joseph Fayrer.

This, and other evidence, pointing to the existence of protection against venom, not only in serpents themselves, but also, in certain exceptional circumstances, in human beings, several years ago originated a wish to further investigate the matter. It was obviously suggested that if protection occurs, it must be caused by some direct result of the

absorption of venom; and, therefore, that its existence could be proved or disproved by experiment. In the former event, the steps would already have been taken to obtain, by further experiments, results likely to be of value in the treatment of poisoning by serpents' venom; and, indeed, likely to be of importance in even the wider field of general therapeutics.

With these objects endeavours were made to collect a sufficient quantity of venom; but the collection has proceeded but slowly, and only after several years has a supply gradually been accumulated sufficiently large to render it probable that definite results would be obtained before the supply of venom had become exhausted in the experiments.

I received my first supply of cobra venom in 1889, from Surgeon-Colonel Moir, lately of Meerut, and soon afterwards —also in small quantities—from the late Dr. Shortt, of Madras, and from Sir Joseph Fayrer, the Thakore of Gondal, and Dr. Phillips. Larger quantities were subsequently obtained from Surgeon-Captain French, and through the kind efforts of Sir William Mackinnon, Director-General of the Army Medical Department, from each of the Presidencies of India; and they had so far increased my stock as to enable me to begin experimental work towards the end of last year. Early in this year a large additional supply was received from Surgeon-Colonel Cunningham, of Calcutta, and this gentleman has quite recently sent a further large quantity of several grammes of dry venom.

But, besides these specimens of the venom of the cobra of India, I have also been fortunate in obtaining specimens of venoms from other parts of the world.

From America, Dr. Weir Mitchell, of Philadelphia—whose work on the chemistry and physiology of serpents' venom constitutes the great advance of the century on the venom of viperine serpents—has supplied me with the venom of three species of rattlesnakes—viz., *Crotalus horridus*, *C. adamanteus*, and *C. durrisus*, and also with a specimen of the venom of the Copper Head (*Trigonocephalus contortrix*).

From Australia, Dr. Thomas Bancroft, of Brisbane, has at various times sent specimens of the venoms of the black snake (*Pseudechis porphyriacus*), the brown snake (*Diemenia superciliosa*), and of a large unidentified snake of the Diamantina district of South Australia (probably a new species of Diemenia).

From Africa, the kindness of Mr. Wm. Smith, a distinguished naturalist of Cape Town, of Dr. Brook, of the Orange Free States, and of Dr. John Murray and Mr. Van

Putten, of Cape Colony, has placed at my disposal small quantities of the venom of the puff adder (*Vipera arietans*), the night adder (*Aspidelaps lubricus*), the yellow cobra (*Naja haie*), and the "Ring Hals Slang" or "Rinkas" (*Sepedon hæmachates*); and Dr John Anderson, formerly Professor of Natural History at Calcutta, has only last week forwarded to me living specimens of the *Vipera cerastes*, to be followed by living specimens of the cobra, which his present connection with the zoology of Egypt has given him peculiar facilities to obtain.

In the meantime, however, further evidence has been obtained in support of the reality of the probabilities to which I have referred. Sewall, using the venom of the rattlesnake, Kanthack that of the cobra, and Kaufmann and Phisalix and Bertrand that of the viper, obtained experimental evidence of the possibility of producing by "inoculation" a certain slight degree of resistance against the toxic effects of these venoms. The relationship of such observations to the recent discoveries in connection with the toxines of tetanus, diphtheria, and other diseases, could not long remain unrecognised. Dr. Bancroft and others have recently suggested "that the blood of animals rendered immune to snake venom might be found of service as a remedy in snake-bite." Within the last few months, Phisalix and Bertrand have obtained experimental indications of the antidotal power of the blood-serum of animals immunized, but only to a low degree, against the venom of vipers; and Calmette, working in the Pasteur Institute of Paris, after several unsuccessful endeavours had led him to express the opinion that immunity against snake venom could not be produced, afterwards succeeded in obtaining evidence of its production, and of the power of the blood-serum to counteract the effects of venom.

In the case of many of the venoms which I have had the good fortune to obtain, the quantity at my disposal was not sufficient for experimental examination on the plan that seemed desirable, and, besides, the examination of each of them would require several months of work. In this, the first portion of the investigation, therefore, the venoms that have been used are only four in number, those namely of the cobra of India (*Naja tripudians*), of the *Crotalus horridus*, or rattlesnake of America, of a large colubrine snake, probably a species of *Diemenia*, from South Australia, and of the *Sepedon hæmachates* of Africa. The venoms are therefore those of the most deadly of the poisonous serpents of Asia, America, Australia, and Africa respectively; and further, they are

representative of the chief differences that occur in the composition and action of venoms, for they are derived from members of the two great groups of the colubrine and viperine serpents.

My supply of cobra venom being much larger than that of any of the others, this venom was chiefly used in the experiments; and in all of those to be referred to, the administration was effected by subcutaneous injection.

An essential preliminary to exact investigations with active substances must always be the determination of the activity of the substances. The only convenient method for doing this is to define the smallest dose capable of producing death for any given weight of animal—that is, the minimum lethal dose. The venoms in their natural state are inconstant in activity, mainly because of variations in the quantity of the water which they contain. The cobra venom has, however, nearly always been received in the form of a dry solid; but when this was not so, it has been dried *in vacuo* over sulphuric acid.

Outside of India, there are few persons skilled in the hazardous task of taking venom directly from living serpents. Accordingly, with a few exceptions, the other venoms were not received in a pure form, but in the form of the dried venom glands. From these glands, however, the poisonous constituents may easily be extracted with water, and on evaporating the solution over sulphuric acid an active dry venom was obtained, containing, however, other substances besides those which are active. I am not in a position, therefore, to make any statement in regard to the relative activity of the different venoms. For the objects in view, what only is necessary is that the exact minimum lethal dose of each venom used should be known, whether it be pure or diluted with a certain small amount of inert matter.

Each of the four venoms was, however, found to be very active, but the cobra venom especially so,—a part of the difference between its activity and that of the other venoms being, no doubt, due to the above circumstances.

Experiments were made with it on several animals—as the guinea-pig, rabbit, white rat, cat, and the innocuous grass snake of Italy (*Tropedonotus natrix*). Very considerable differences were found to occur in the minimum lethal dose for each of these animals. For the guinea-pig the minimum lethal dose per kilogramme was .00018 grm.; for the rabbit, .000245 grm.; for the white rat, ·00025 grm.; for the cat somewhat less than ·005 grm.; and for the grass snake the

relatively larger dose of ·03 grm.* Cobra venom thus takes a position among the most active of known substances, rivalling in its lethal power the most potent of the vegetable active principles, such as aconitine, strophanthin, or acokantherin.

These facts having been ascertained, attempts were next made to render animals proof against lethal doses, by administering to them a succession of gradually increasing non-lethal doses. These were, for the first few doses, in some of the experiments one-tenth of the minimum lethal, in others one-fifth, in others one-half of the minimum lethal, and in others almost as great as the minimum lethal. At varying intervals the doses were repeated, and by-and-by gradually increased, until the actual minimum lethal had been attained. The subsequent doses, by gradual increments, exceeded the minimum lethal, and after five or six times the minimum lethal had been reached, it was found that the increments could be increased, so that each became twice, four times, and latterly even five times the minimum lethal, and still the animal suffered little, and, in many cases, no appreciable injury.

This brief statement, however, does not represent the experimental difficulties that were encountered. It describes the course of events in the altogether successful experiments. Non-success, however, was frequent, and many failures occurred before experience indicated the precautions and conditions that are necessary for success.

Serpents' venom exerts what may broadly be described as a duplex action. It produces unseen functional disturbances, and it also produces visible changes. The latter are of a highly irritative character, causing intense visceral congestions in the lungs, kidneys, and other organs, and, when given by subcutaneous injection, on all the structures of the skin and adjacent parts. There are apparently also some definite changes produced in the blood, with regard to which several important facts have been discovered by Dr. Martin, of the University of Sydney. Irritative effects are obviously produced by cobra venom, even in non-lethal doses, and with greatly increased virulence by doses that exceed the minimum lethal; but, in respect to this action, the other three venoms used are greatly more active than the venom of the cobra. Evidence was obtained to indicate that in the process of immunization, a diminution occurs in the intensity of these

* Guinea-pig, nearly 1/5 millig.; Rabbit, nearly ¼ millig.; White Rat, ¼ millig.; Kitten (6 weeks), 2 millig.; Cat, 5 millig.; Grass Snake, 3 centig.

local actions; but this diminution does not proceed so rapidly as that in the unseen functional or other changes which are the more direct causes of death; and, further, the local irritative changes, after having been produced, are slower to disappear than the unseen functional disturbances. Until these facts had been appreciated, and, indeed, even with the adoption of precautions suggested by them, frequent failures occurred. The apparently contradictory results accordingly were obtained of the production, by gradually increasing doses, on the one hand, of a protection against quantities much above the minimum lethal, so perfect that no apparent injury was caused; and, on the other hand, of an intolerance so decided that death was produced by the last of a succession of gradually increasing doses, no one of which was so great as the minimum lethal. The latter unfortunate event was frequently displayed in guinea-pigs, and attempts to carry immunization in them to a high point were found to be extremely difficult.

Notwithstanding these difficulties, however, such gratifying results have been obtained as that rabbits could at last receive, by subcutaneous injection, so much as ten, twenty, thirty, and even the remarkable quantity of fifty times the minimum lethal dose, without manifesting any obvious symptoms of poisoning.

Almost the only observable phenomena were a rise in the body temperature, which continued for a few hours after the injection, and which contrasts with the fall that occurs, after the administration of even non-lethal doses, in non-protected animals; and a loss of appetite, which usually, though not invariably incurred, and was probably the cause of a temporary fall in weight during the day or two days succeeding such injection. On the other hand, during the process of successful immunization, the animals increased in weight, they fed well, and appeared to acquire increased vigour and liveliness. This has been frequently exemplified in the smaller animals, such as rabbits; and also, very conspicuously, in an aged and previously sedate horse, which, in the process of immunization has now received ten times the estimated minimum lethal dose.

It is marvellous to observe these evidences of the absence of injurious effects, and even of the production of benefit in an animal which, for instance, has received in one single dose a quantity of venom sufficient to kill, in less than two hours, fifty animals of the same weight, and in the course of five or six months a total quantity of venom sufficient to destroy the

lives of 370 animals of the same species and weight. There are few facts in the whole range of biology more calculated to arrest the attention or produce astonishment in the mind of the observer!

With the cobra venom, I have also immunized cats, both by subcutaneous and by stomach administration; but the significance of the latter method of administration must be reserved for a future communication. As I have stated, a horse is also being immunized; and I have to express my obligations to Professor Williams for granting me the accommodation of their establishment, and to Professor Davis, M.R.C.V.S., also of the New Veterinary College, for much valuable assistance.

Following the same plan of research with the three other venoms, it was found that the minimum lethal dose per kilogramme for rabbits of the Diamantina venom* is ·0015 grm. per kilogramme, of the venom of *Sepedon hæmachates*, ·0025 grm.; and of the venom of Crotalus ·004 grm. The Crotalus venom is, in its purity, altogether comparable with the cobra venom; and the determinations, therefore, show that cobra venom is sixteen times more powerful than Crotalus or rattlesnake venom. This venom, as well as the two others, however, much exceed cobra venom in the intensity of their local action. When death is produced by Crotalus venom, the subcutaneous tissues become extensively infiltrated with a large quantity of blood and of blood-stained serum, the underlying muscles are reduced to an almost pulpy blood-stained substance, and post-mortem decomposition occurs very soon after death. Similar changes in the subcutaneous tissues, but to a rather less degree, are caused by the Diamantina venom, and in addition, hæmaturia, or more probably hæmoglobinuria was invariably produced by lethal and even by large non-lethal doses. I mention these circumstances to indicate the perfection of the protection which is produced by the administration of successive gradually increasing doses; for they can be so adjusted that a dose of each venom, even three times larger than the minimum lethal, may be administered without producing more than an inconsiderable and even scarcely observable degree of local destructive effect.

In the meantime, the process of protection with the latter venoms has not advanced further than three times the minimum lethal dose. This, however, has been sufficient to

* Diamantina venom, 1½ milligramme; *Sepedon hæmachates*, 2½ milligramme; *Crotalus horridus*, 4 milligramme.

allow experiments to be made by which it has been demonstrated that when an animal has acquired a resistant power over the minimum lethal dose of one venom, that animal is also able successfully to resist the lethal action of a dose above the minimum lethal of other venoms. To a rabbit immunized by cobra venom, a dose above the minimum lethal of Sepedon venom has been administered; to rabbits immunized with Crotalus venom, doses above the minimum lethal of Diamantina and of cobra venoms have been given; to animals immunized above the minimum lethal with the Diamantina venom, doses above the minimum lethal of Crotalus and Sepedon venom have been given, and in each case the animal has recovered, and but few symptoms of injury were produced. At the same time, in other experiments, indications were obtained that animals immunized with a given venom are capable of resisting the toxic effect of that venom more effectually than the toxic effects of other venoms.

My experiments have not yet proceeded sufficiently far to show for what length of time the protection conferred by any final lethal dose may last. I propose to make some experiments which will give definite information in regard to this point, and these may possibly lead to practical applications. It has incidentally been discovered, however, that protection lasts for at least a considerable period of time, even when the last protective dose has not been a large one. For example, to a rabbit which had last received twice the minimum lethal dose of Crotalus venom, the same dose was administered twenty days subsequently, and it altogether failed to produce any toxic symptoms.

Before passing to the next part of my communication, it may be stated that as yet no sufficient data have been obtained for affording an explanation of these remarkable facts. It is obvious that the blood of protected animals must contain some substance or substances which are not present in the non-protected animals, and by which the lethal and toxic effects of venoms are prevented. I have observed that when the blood-serum of protected animals is added to a solution of venoms, a distinctly observable reaction occurs, and this reaction may be of significance, when considered along with circumstances which will be stated in the remaining part of this communication, and especially with the circumstance that the blood-serum is itself almost destitute of physiological activity. This protective substance may be produced in the body by the influence of the venom, but it is also conceivable that the

substance is actually a part of the venom itself, which gradually accumulates under repeated administrations, whereas the lethal and toxic constituents of the venom are more rapidly destroyed or eliminated.

Having thus succeeded in producing a high degree of protection in animals against the toxic effects of serpents' venom, the blood-serum of these animals was, in the next place, collected for the purpose of testing its antidotal properties.

A few preliminary experiments were, however, early made with the serum of animals in whom the protection had not been carried to a high degree, and they were sufficient to show that antidotal properties are possessed even by this serum. It soon became apparent that in order to obtain some reasonable approximation to constancy in the conditions of the experiments, it was necessary that the serum snould be in such a state that it would remain unchanged during at least several weeks. It was found that this could be insured without any appreciable loss of antidotal power by drying the freshly separated serum in the receiver of an air-pump, over sulphuric acid, after it had been passed through a Chamberland's filter. A perfectly dry and easily pulverisable solid was thus obtained, which could be kept unchanged for probably an indefinite time, and from which a normal serum could easily be prepared as required, by merely dissolving a definite quantity of the dry serum in a definite quantity of water.

To this serum, whether in the dry form or in solution, it would be convenient to apply the name "*antivenene*."

The greater number of the experiments now to be described were made with antivenene derived from the mixed serum of three rabbits, which had last received a dose of cobra venom equivalent to thirty times the minimum lethal. I avoid the expression "immunized against" thirty times the minimum lethal dose, for, as a matter of fact, an animal is always protected, or immunized, against a dose considerably above the last which it had received.

The experiments were so planned as to obtain, in three or four different conditions, as exact a definition as possible of the antidotal power of the antivenene. In the meantime, four séries of experiments have been undertaken on rabbits; but all the experiments required to complete two of these series have not yet been made. In one series, the venom was mixed outside of the body with the antivenene, and immediately thereafter the mixture was injected under the skin of

the animal; in the second series, the venom and antivenene were almost simultaneously injected into opposite sides of the body; in the third series, the antivenene was injected some considerable time before the venom; and in the fourth series, the venom was first injected, and thirty minutes afterwards the antivenene.

All, or nearly all, the experiments required to define the exact quantity of antivenene that is sufficient to prevent death from different lethal doses of venom have been as yet made only in the first and fourth of these series. They are, however, in some respects the most important of these series: as the conditions for exactitude in simultaneous administration are perfectly obtained in the first series, and it, therefore, should constitute the basis for comparison between antivenenes derived from different sources; and as upon the results of the fourth series must depend the actual practical application of antivenene in the treatment of poisoning by serpent bites.

In the experiments of the first series, the doses of cobra venom administered were the minimum lethal, twice the minimum lethal, and thrice the minimum lethal. In the case of each dose, experiments were made with different quantities of antivenene so as to determine the quantity required to prevent death. In order to render it certain that a lethal dose was always administered in the experiments with the so called minimum lethal, the minimum lethal indicated by the previous experiments was not used, but instead of it a slightly larger dose (·00026 instead of ·000245 grm. per kilogramme).

When this certainly lethal dose, capable of causing death in five or six hours, was mixed with antivenene and the mixture then injected under the skin, it was found that so small quantities of antivenene were sufficient to prevent death, as ·5 c.c., ·25, ·1, ·05, ·02, ·01, ·005, ·004, c.c. ($\frac{1}{2}$, $\frac{1}{5}$, $\frac{1}{10}$, $\frac{1}{20}$, $\frac{1}{100}$, $\frac{1}{200}$, $\frac{1}{250}$ of a c.c.) for each kilogramme of the weight of the animal. With ·0025 c.c. ($\frac{1}{400}$), however, the animal died. The antivenene was therefore found to be so powerful as an antidote, in the conditions of these experiments, that even the $\frac{1}{250}$ part of a cubic centimetre, equivalent to about one $\frac{1}{15}$ part of a minim, acted as an efficient antidote. Even with the smallest of these doses of antivenene there was almost no symptom of poisoning produced. In the experiments of this series with twice the minimum-lethal dose recovery occurred when the doses of antivenene were ·75 c.c., ·7 c.c. and ·6 c.c. per kilogramme, but ·5 c.c. per kilogramme failed to

prevent death. In the experiments with thrice the minimum lethal dose of venom (a dose capable of producing death in less than two hours), recovery occurred when the doses of antivenene were 1·5 c.c. and 1 c.c., but death occurred with ·8 c.c. And even the enormous dose of four times the minimum-lethal failed to produce death, or indeed any observable disturbance, when it had previously been mixed with 2 c.c. per kilogramme of antivenene.

In the *second* series, experiments have been made only with twice the minimum-lethal dose of venom. When this dose was injected into the subcutaneous tissue of one side of the body, and immediately thereafter a dose of antivenene, it was found that doses of 1 c.c., 2 c·c. and 3 c.c. per kilogramme failed to prevent death, but that 4 c.c. and 5 c.c. per kilogramme were able to do so.

In the *third* series, the experiments have as yet been made with only the minimum lethal of cobra venom, and they show that ·4 c.c. per kilogramme of this antivenene is able to prevent death, when given 30 minutes before the venom.

In the *fourth* series, where the results are likely to give the clearest indications of the antidotal value of antivenene, it was found that recovery occurred in the experiments in which 1·5 c.c., 1 c.c., and ·8 c.c. per kilogramme of antivenene were injected *thirty minutes after a certain* minimum lethal dose of venom, but that the antivenene was insufficient in quantity to prevent death when ·75 c.c. per kilogramme or less was administered.

In this series, further, it was found that 5 c.c. per kilogramme of antivenene was a sufficient dose to prevent death after twice the minimum lethal dose of venom; but that 2 c.c., 2·5 c.c. and 3 c.c. per kilogram were insufficient.

The experiments of this series are specially interesting, as nearly all the animals showed symptoms of poisoning before the antivenene had been administered. In each of the fatal experiments, the duration of life was greatly prolonged by the administration of antivenene; and, it is probable that in many instances a second injection, made half-an-hour or an hour after the first, would have prevented death.

It has thus been established, on the clearest evidence, that the blood-serum (antivenene) of animals protected against large lethal doses of venom is able, in varying conditions of administration, perfectly to prevent lethal doses of the venom of the most poisonous of serpents from producing death in non-protected animals.

In order to obtain some evidence bearing on the question

as to whether the more powerful antivenene is produced by the long continued administration of small non-lethal doses of venom, or by the administration of doses gradually increasing until a large lethal dose is reached, a few experiments were made with the serum of a rabbit which had received $\frac{1}{10}$ of the minimum lethal dose nearly every two days during a period of three months and one week, and also of one which had received the $\frac{1}{4}$ part of the minimum lethal dose nearly every four days during a period of three months and three weeks. I did not find that the antidotal power of the antivenenes obtained from these animals was great, or nearly so effective as the antivenenes obtained from animals which had finally received a dose much in excess of the minimum lethal. When mixed with venom and then injected, 3 c.c. per kilogramme of these antivenenes was insufficient to prevent death from somewhat more than the minimum lethal dose of venom, but 5 c.c. per kilogramme were sufficient to do so.

I have also administered 1·5 c.c. per kilogramme of cobra antivenene thirty minutes after a dose one-twelfth larger than the minimum lethal of the venoms, respectively, of the *Zepedon hæmachates*, the *Crotalus horridus*, and the *Diementina* serpent; and the rabbits experimented on have recovered. This successful result is all the more remarkable when the intensely destructive local effect of each, but especially of two, of these venoms is recollected.

The experiments establishing, and to some extent defining, the antidotal power of cobra venom, further, have been made on animals peculiarly susceptible to the poisonous action of serpents' venom, a circumstance of importance in considering the probable value of the antivenene when used as an antidote in the treatment of animals of less susceptibility, among whom there appears to be sufficient evidence to place human beings. This minimum lethal dose for man probably approximates that of the cat, rather than that of vegetable feeders such as the rabbit, guinea-pig, and white rat.

It is also to be remembered that, in the meantime, the experiments have been restricted to a definition of the antidotal power in certain conditions which were not always the most favourable for the mere prevention of death. Indications have indeed been obtained which render it highly probable that death may be prevented from occurring more certainly by several administrations, rather than by one administration of antivenene, and also by the introduction

of the antivenene into the same parts as the venom, rather than into distant parts.

It would be important also to increase the number of the experiments with the larger of the lethal doses of venom as yet administered, and, it may be, to employ still larger doses; although, for practical application, the larger of the doses that have already been used, as they produce death in about an hour, need not be increased.

To these purposes I hope to apply the antivenene soon to be prepared from the rabbits which have already received fifty times the minimum lethal dose of venom.

For the actual application of the antivenene to the treatment of snake-poisoning in man, an endeavour is being made to obtain the large quantity that is requisite, from a horse now receiving considerable lethal doses of cobra venom. From this source, also, it is hoped that a sufficient quantity will be obtained to allow of the examination of the chemical properties of the antivenene to be continued, with the object of discovering the constitutent or constitutents by which the antidotal effects are produced. If the isolation of the antidotal constituent or constituents can be effected, an antivenene of greatly increased power will be obtained, and the range of efficient application will be increased. For these objects, however, it will be necessary to administer to the horse much larger doses than it has yet received; and the chief difficulty in doing this is to obtain a sufficient supply of cobra venom. By the great kindness of Surgeon-Colonel Cunningham, 9 grms. of dry venom have already been obtained, but in order to carry the protection to fifty times the minimum lethal dose, other 30 grms. would be required. I have reason to hope that the India Office will succeed in making arrangements for procuring even this large quantity.

The subject is one of practical importance to India, where the destruction of human life by venomous serpents is represented by an annual mortality of 20,000, and where the failure of all methods of treatment* has led to the introduction of a system of extermination of venomous serpents—apparently futile in its results—in the carrying out of which large sums of money have been expended.

In considering the probabilities of success by antivenene treatment, it is also to be recollected that antivenene can be obtained even more powerful than that which was used in the

* "After long and repeated observation in India, and subsequently in England, I am forced to the conclusion that all the remedies hitherto regarded as antidotes are absolutely without any specific effect on the condition produced by the poison."—Sir Joseph Fayrer *on the Nature of Snake Poison.*

experiments which have been described; and that, judging from the statistics of Fayrer and Wall, in 75 per cent. of fatal cases in man death does not occur until from three to twenty-four hours after the infliction of the bite. This latter fact appears to indicate that in the great majority of the fatal cases the dose of venom does not much exceed the actual minimum lethal; and, therefore, is not so large as the doses whose lethal action has been prevented from occurring in the experiments that have been described; in which, further, the conditions for success in preventing death were not the most favourable that could have been adopted.

It appears to me, however, that an interest and importance as great as that which can be derived from this practical application of the facts which I have brought before the Society, is to be found in their relation to the cause and treatment of many of the most fatal of diseases—those, namely, which are produced by organisms that have found their way into the body. The evidence in favour of the curative value of the antitoxines derived from animals immunized against the toxines of these diseases, seems to receive an additional confirmation from these facts. They also bring distinctly before us the fact that there are limits to this curative power, dependent on the dose of the toxine to be counteracted, on the special antidotal activity of the antitoxine that is used, and on the duration of the time during which the toxine has had an opportunity of exerting its poisonous action before the antitoxine is administered. If these and other conditions interfering with successful treatment are not determined and recognised, unmerited discredit is likely to be attached to remedies which alone of all remedies may be capable of preventing death in these diseases, by counteracting the effects of minimum lethal and larger doses of the toxine.

THE MANGE, BY SARCOPTES PRECOSE CANESTRINI, ON THE RABBITS.

BY BRUNO GALLI-VALERIO, M.D.V.S., PATHOLOGICAL INSTITUTE OF THE ROYAL VETERINARY SCHOOL OF MILAN.

As far as the year 1892 but a single species of mange was described on the rabbit: the mange by *Notsedrus cuniculi*, Roull.

In this year Professor Neumann * discovered in the rabbit another species of mange. It was characterised by the following symptoms:—

* Revue Vétérinaire, 1892, p. 141.

Beginning at the apex of the nose, lips, chin, and root of the nails; extending to the posterior face of the paws, and up to the knees and apex of the tail. On the adults, it can extend itself to the forehead, ears, and different parts of the body. It causes the formation of gray scales, thin on the ears, forehead, and back; but on the apex of the nose, root of the nails, and on the horns can assume the thickness of one centimetre. The scales being detached, remain a bloodish surface; and the animal manifests great pain.

This mange is very little itching, but the animals die in a month or six weeks.

The parasite that provokes this mange is a mite like to the *Sarcoptes scabiei. De Geer.*, and Neumann named it: *S. scabiei var. cuniculi.* The samples examined by Neumann had the following dimensions:—

♂ length, mm., 0·23.
breadth, mm., 0·17.
♀ ovigera length, mm., 0·41.
breadth, mm., 0·32.

An important particular of this mite is the presence of a developed embryo in the eggs still lying in the body of the female.

In the year 1893 Professor Roillet * found also the *S. scabiei var. cuniculi* on the rabbits, and gave the following dimensions:—

♂ length, μ 210—228.
breadth, μ 155—178.
♀ ovigera length, μ 340—400.
breadth, μ 260—300.

They state that the ♂ were very numerous.

Professor Canestrini, studying this mite in the year 1894 †, gave it the name of *Sarcoptes precose*, and the following characters as different from the *S. scabiei*:—

Numerous dorsal scales in the form of an equilateral triangle. They are closed to each other and extend back between the iliac spines. These are coarse, broad at the base, and rather sharp-pointed. Epimera of second pair in the ♂, with the distal extremity turned outside.

Professor Canestrini gave the following dimensions:—

♂ length, mm., 0·23—0·25.
breadth, mm., 0·17—0·18.
♀ ovigera length, mm., 0·41—0·44.
breadth, mm., 0·32—0·34.
larva length, mm., 0·15—0·17.
breadth, mm., 0·11—0·14.

* C. R. S. de Bisl., 1893, 15 Zuillet.
† Prospetro deli'oscarofauna Italiano, Parte vi., Tadover, 1894.

In the year 1894 I first found this mange on the Italian rabbits, near Milan.*

In the samples studied by me, I found the characters described by Professor Canestrini. The presence of very good developed embryos in the eggs lying in the body of the ♀, were very frequent.

The dimensions were as follows:—

♂ length, μ 230.
breadth, μ 160.
♀ ovigera length, μ 435.
breadth, μ 335.
larva, length, μ 167.
breadth, μ 134.
larva into the egg, length, μ 150.
breadth, μ 100.
egg-length, μ 150—160.
breadth, μ 88—110.

The lesions determined on the rabbits that I examined were like that described by Professor Neumann; the nose was elongated in a horn, made by the co-glutination of scales. The lips, paws, and particularly the interdigital spaces, were covered by scales which were arranged as a thimble on the fingers. Microscopical lesions provoked by this mite on the skin were described the first time by me: microtomic sections of scales appear dotted by mites, and crossed with hairs. In some parts are found heaps of mite's excrements. Little films of blood glueing the scales leading to the formation of horns or those on the nose. In perpendicular sections, the mites appear inclosed in little depressions covered by the plaits of epidermis. In the points where the lesions are more advanced, these depressions deepen more and more, particularly there where three to four hairs' follicles come together. In this case, frequently, the mites invade the follicle. In every section it is possible to observe a lesion like that described by Professor Piana† in the mange of rabbits caused by *N. cuniculi*. It is a succession of depressions in the derma which represent a true atrophy of the tissue. But the main point of view, under which I will study here this mange of rabbits, is that of the contagion.

Professor Neumann put five young rabbits in a cage with scabby rabbits, and three died of that disease, and stated that Todés saw a family of 30 rabbits quickly die of it.

Professor Roillet states that he succeeded to infect in from eight days to a month rabbits living together with scabby

* Moderno Zosiatio, 1894, No. 22.
† Ann. R. Sc. Med. Vet. Milanno, 1885—86.

rabbits, or for only staying in cages where these had lived. Death happened from three to six weeks.

The epizooty that I have studied near Milan, was caused by a scab by rabbit put among the family. In a month, all the animals were infected and other rabbits put during the year were also infected. All of them died. In October I ordered disinfectants, and the cessation of the breeding for several months. But in spring 1895, new rabbits were put in the warren, and all contracted the mange, and the owner had to cease the breeding.

Is this mange transmissible to other animals?

Professor Neumann inoculated two dogs, a sheep, a cow, a pig and a horse, but with no result.

Professor Roillet observed the transmission to guinea-pigs and ferrets by living in cages, infected with scales of scabby rabbits.

In the year 1894, I observed the natural transmission to a pregnant guinea-pig. The mites taken on this animal had the following dimensions:—

♂ length μ 241.
breadth μ 180.
♀ ovigera, length μ 325.
breadth μ 268.
Larva, length μ 174.
breadth μ 127.

Another guinea-pig that I put in a cage infected with scales, was not infected.

I also made inoculations on the dog, but with no result.

I observed also that men, poultry, and a dog who cohabited with scabby rabbits were not infected.

To assure myself of the impossibility of transmission of this mange to man, I experimented on myself. I scraped the skin on the wrist and rubbed the place with the scales, which I left *in situ* with a bandage. Notwithstanding that this place was left bandaged for two weeks, there was no appearance of the mange.

These observations and experiments on the contagiousness of this rabbit's mange have, I think, a great importance under the point of view of rabbits' destruction with *Sarcoptes precose*. In fact, while the rabbit's mange by *Notosdrus cuniculi* is very little contagious for rabbits,* the mange by *S. precose* is endowed with a great power of contagiousness

* Professor Rouillet states, in fact: "Nous n'avons per la transmettre à de loipicus par le dépôt de nombreaux surcoptes sur la peau rasée, ni même par une cohabitation de onez jours" (33 *Zool. Méd.*, 1893).

for rabbits. In a short time many, very many of these animals are struck, particularly the young, and all the infected die.

At the same time, it is difficult to infect guinea-pigs, ferrets, and other animals; and, what is more important, man is refractory to this infection.

Therefore it is not dangerous to employ *Sarcoptes precose* for the destruction of rabbits in the lands where they are too numerous. It is sufficient to introduce one scabby rabbit in the lairs to infect all the colony.

Editorial.

MARKINGS IN EXAMINATIONS.

THE examinations have come and gone and those students who satisfied the examiners have gone home rejoicing, whilst those who failed have gone home in sorrow. I remember being present once at a distribution of prizes in one of our large Edinburgh schools and the chairman, who was at that time Master of the Merchant Company, said in his address to the students that he divided them into three classes—namely, those who had deserved prizes and obtained them; those who had not deserved prizes and had not obtained them; and finally, those who had deserved prizes but had not obtained them. The division was excellent. There must always, I fear, be a section of deserving young men in every school and college who have been badly treated by fortune as personified in that awful being, the examiner, and have gained less than they deserved. It is on their behalf that I take up the cudgels just now.

I observe that my friend Mr. Rutherford, at the recent meeting of the Royal College, spoke in favour of the old system of marking, and expressed a preference for marks like "good," "sufficient," "bad," as compared with arithmetical symbols, but I entirely disagree with Mr. Rutherford. I think the new arithmetical system very much superior to the old, as being more rational, as giving a better gradation and as being more in harmony with the University system. I cannot support my opinions better than by reporting a conversation which I had the other day with a friend of mine who has had considerable experience as an Examiner in one of our Scottish Universities, both with regard to Entrance and Degree Examinations. My friend told me that the system employed by him and his colleagues was strictly arithmetical—no other was allowed, and, indeed,

he said, no other was practicable. The Board lays down precise laws for marking papers, from which no deviation is permitted; so much is given to each paper and so much to each section thereof. The divisional examiner, who has been appointed by the Board to draw up the paper, gives further details as to the marking of each individual question, and, in subdividing, it very often happens that even fractions are used, such as $2\frac{1}{2}$, $3\frac{3}{4}$, etc. My friend added that in one examination-paper which he had to revise he found it desirable to use decimals, in order to obtain finer shades of marking in a question which contained a great number of minute details. A pass-mark is fixed in all subjects, and candidates failing to reach this mark are disqualified. Of course, there are always a number of doubtful candidates, but their cases are always specially considered by the Board, which, at its half-yearly meetings, has absolute power to ratify or alter the marking of the examiners. This is done, not only for the purpose of keeping examiners in check, but also with a view to maintaining a uniform and just standard in all four Universities. My friend follows this system most religiously, deducting for each mistake made by the candidate a certain fraction of a mark, determined by the length of the question and the total number of marks allowed for a correct answer. In the case of a serious mistake, he deducts two or even three such fractions, and then, when all the papers written by the candidates have been revised, he goes over the doubtful papers a second time, for his own satisfaction, taking, this time, a general survey, and neglecting individual errors, but rather comparing paper with paper. In nearly every case he finds that his original judgment, guided by arithmetical considerations, was sound; and thus, having given the doubtful men (that is, those just above and below the pass-mark) the benefit of a two-fold revision, he abandons them to their fate or to the mercy of the Board. A line has to be drawn somewhere, and he has drawn it; he has satisfied himself that there is a distinct line of demarcation in point of real merit between, let me say, A. with 51 marks and B. with 49, that these figures, although in the first instance applied after a mere process of arithmetical calculation, indicate the difference between success and failure, if the pass-mark is 50, and so he never feels any qualms of conscience, and his marking has never been altered by the Board. I repeat all this because I think the University system of marking and valuing papers most admirable; besides, it is quite practicable, has been found to work smoothly, and is, although apparently com-

plicated, really quite simple. I trust our Board of Examiners will adhere to the arithmetical system.

I questioned my friend further as to whether compensation was allowed by the Universities when several subjects have to be taken, and the candidates fail in one or more. He gave me to understand that there was something of this kind, that excellence in one subject was allowed to compensate for deficiency in another, care being always taken that no candidate, who had signally failed in any one subject, should be allowed to get through, however excellent he was in his other subjects. This appeared to me quite just; pretentious ignorance ought to be punished. The man who has a mere smattering of a subject ought to be sent back to his studies, and bidden stay at them till he has become wiser and more modest. Besides, to allow such a man to pass, is to outwit the intentions of the Medical or Veterinary Council, whose object is to obtain breadth of culture, and strength and solidity of knowledge—not mere evanescent brilliance.

I venture to submit what I have written to the gentlemen forming the Examining Board, in the hope of strengthening them in their resolution to use the new system of marking, and of inducing them to adopt a compensation scheme. No one knows better than I do the misery caused by failure to the hard-working, conscientious student, who does well in every subject but one, and there finds that memory, by a sudden and unexpected treachery, leaves him helpless and at the discretion of the examiner. Surely, in such cases mercy is more noble than justice.

I had almost forgotten one point. My friend, the examiner, told me, on authority which I acknowledged to be undeniable, that the Scottish Education Department use the arithmetical system in valuing the papers of candidates for the Leaving Certificates.

AN IMPORTANT DISCOVERY.

ONE of the most remarkable discoveries of modern times in the field of medical science, has just been communicated to the scientific world by Professor Thomas R. Fraser, of the University of Edinburgh. The results of Professor Fraser's patient and laborious investigations were made known at the beginning of last month to the Royal Society of Edinburgh in a paper read by the learned Professor himself, and I am privileged in being able to print this paper at full length in another page of the Journal. There occur from time to time in this world's history great events which mark, so to speak,

the progress of the human race; they may be very simple, as was the discovery of the power of steam or vaccination, and they may make us wonder that we did not ourselves see what was for so long a time actually staring us in the face, but they are none the less epoch-making discoveries. The world is never the same world after these discoveries that it was before—can never be; we are, as it were, by them inoculated against an old virus of ignorance or superstition, and we are no longer susceptible to its influence. There is something so grim and so mysterious, so silent, and so unerringly fatal about the poison-bearing snake that it is not wonderful if our remote ancestors regarded it as the incarnation of wisdom. "Now the serpent was more subtle than any beast of the field which the Lord God had made." So speaks one of the most ancient historical books of the world in its most ancient myth, and we seem to feel no surprise that the serpent should be then and afterwards looked upon as the embodiment of the spirit of cunning or of evil, or as being the enemy of mankind—all the more deadly because of its secrecy and mystery. "I will put enmity between thee and the woman, and between thy seed and her seed; it shall bruise thy head, and thou shalt bruise his heel." The last clause of the heavenly curse has been amply fulfilled; the loathsome serpent has treacherously performed his deadly task; are we now going to see the fulfilment of the other part of the renunciation? Is man to bruise the serpent's head, strip it of its horrible fangs, and render its poison innocuous? This is the problem which Professor Fraser set before him, and very wonderfully has he solved it so far. When once he has perfected his plans and finished his investigations—and this is only a matter of time, the essential difficulty of determining the nature and the mode of operation followed by the poison having been removed—we may look for immunity against one of the greatest scourges of the human race, as well as of our domestic animals.

Seldom has so interesting a paper been brought before the readers of the VETERINARY JOURNAL, and I therefore cordially recommend it to their most careful perusal.

ANOMALOUS NERVOUS SYMPTOMS PRODUCED BY PARASITES.

BY J. T. DUNCAN, M.D.

THAT serious reflex nervous phenomena may be produced by the presence of parasites in the intestinal tubes is fully admitted by authorities upon human medicine.

In regard to this, Ransome, writing in Reynold's System of Medicine, observes: "*Post-mortems* have shown that round worms produce serious and even fatal convulsions in susceptible persons." Cobbold, in Quain's Dictionary of Medicine, remarks: "They sometimes produce cerebral disturbance in several cases, amaurosis, catalepsy, convulsions, crotomania," while J. Lewis Smith in his work on diseases of children, gives the following as some of the results, or effects of the round worms: "unequal dilation of the pupils, twitching of muscles, clonic convulsions, delirium, rarely deafness, chorea, paralysis, and night blindness."

So far human medicine, how is it in the lower animals? Will parasites produce in them grave cerebral disturbance (in the horse for instance), as shown by temporary loss of sight, delirium, convulsions, even going on to a fatal termination?

Scattered through the various veterinary journals are to be found cases which might be used as illustrations of this point; but in this short article, instead of quoting these, I prefer to record an interesting series of cases occurring in the practice of Mr. R. Robb, V.S., a graduate of the Ontario Veterinary College.

His experience is important, and strongly supports the position that parasites of various kinds will produce the most serious reflex nervous phenomena in the horse, especially in the young animal. The following is the gist of his letter:—

Case No. 1. On the 31st December I was called out to see a nine months' old colt four miles in the country. I found the colt standing and being supported by an attendant.

The colt was in a comatose condition. I told the man to leave it alone to see what it might do, but it fell to the ground as if lifeless, showing no resistance whatever. Pulse 52, rather weak; respiration slower than normal; temperature 99 2/5. I refused to give any treatment. Next morning I went and found the colt dead, it having expired at midnight without a struggle. The stomach, on *post mortem*, was literally covered with bots, especially the cuticular portion of it.

On cutting open the small intestines I found in all 115 round worms (Ascaris megalocephala). The small intestines were empty, the remainder of the canal having fæcal matter throughout.

I had occasion to go back to the place the next morning, and was met at the gate and asked quickly to come as they had another sick colt. The colt was rising three. He had been frantic in his box before my arrival, running against

everything, plunging and kicking. When I got to the box the colt was standing and being held by two men, one on each side of him; he was rather quiet and in a semi-comatose condition, but easily excited. He was quite blind as seen from his actions. Pulse and respiration being 40 and 10 respectively. After watching him a few minutes I came to the conclusion that I would try and drench him. Gave him purgative (aloin) along with four drachms of brom. potas., giving the latter three times a day after this in his water, as he was very thirsty. After the purgative commenced to operate, say, 24 hours after, he began to brighten up. In four days his eyesight had returned, and he improved right along. I watched for parasites, but none were passed during his sickness. Suspecting the food to be the cause of the trouble, I examined it. I came to the conclusion that it might be the ensilage that was causing the cerebral symptoms, and I advised him to withdraw it, though I had mentioned to the owner that the bots and worms were the cause of the first one's death. Both colts were in good condition, and had been fed on the same kind of food, ensilage, straw, and fodder.

Case No. 3. The third one was a colt coming three, but being a promising colt he had been in the city all fall and winter, and getting entirely different food from the others. On the 5th January the colt was apparently in his usual good health. About five p.m. he was found lying against the partition of the stall in an awkward position, his head elevated as though he was trying to reach for some fodder that was hanging from the roof of the stable. He was quiet, but when made to get up was found to be quite blind, as he would walk up against anything in the box. In a little time he got excited and jumped over into the next box-stall. Being frantic now, he plunged here and there all over the interior of the stable, knocking down everything that came in front of him. He then plunged through the side of the stable and ran down an alley that was close by as fast as he could go. Thinking the colt was mad I was sent for about ten p.m. I found the colt about 100 yards away from the stable bracing himself sideways against a fence. He seemed to be fast asleep, his neck and head elevated, and over the fence. By much effort we got him back to the stable. He was very much bruised about the head; one eye was closed and swollen very much, the other was normal but was perfectly blind. I attempted to give him medicine when he started to plunge in a frantic manner. We seized the halter and managed to

throw him and kept him down, he kicking violently. After he was cast I gave him three drachms aloin and pot. brom., four drachms conjoined in a little water. The struggling and kicking was severe until five a.m., when it became more tranquil and intermittent. I gave brom. three drachms every two hours after the first dose until seven a.m., when I saw that the end was near. Before death the breathing became stertorous, he died very quietly. After being removed to the knacker's-yard I held a *post-mortem*. I found the stomach somewhat distended with fluid ingesta, there being about 50 bots here and there attached to the cuticular portion and a few on the villous. At the pyloric opening, however, hundreds of bots clustered together so that it was impossible for me to count them; they completely blocked the opening. The mucous membrane on the villous portion seemed to be denuded in some parts and easily stripped off, also some parts of the small intestines here and there were in the same condition. The brain was normal.

In only one of these cases does it appear that the brain was examined, but in this, showing more profound involvement of the central nervous system than either of the others, the brain was found to be normal. And in neither of the autopsies was appreciable cause found for the anomalous nervous symptoms saving the presence of the parasites. Such being the case it is fair to consider two at least of these cases as illustrations of the reflex nervous phenomena which may be produced in the horse by parasites in the stomach or intestines.

The abdominal tumour sent last month by Mr. Elliott, veterinary surgeon, Darlington, proved to be really an abscess with excessively thickened walls. As our correspondent suggested it had the appearance of being of tuberculous origin, but in spite of the fact that the pus from tuberculous lesions invariably teem with the tubercle bacilli, none could be found in the contents of this growth after repeated attempts to demonstrate it. The tumour was probably a relic of an old attack of strangles.

ESSAY ON ANÆSTHESIA.*

BY MR. T. R. MULCAHY.

MR. CHAIRMAN AND GENTLEMEN,—It is with the greatest diffidence that I have decided to lay before you to-night my

* Read before the Edinburgh Veterinary Medical Society.

ideas on anæsthesia, for I am well aware it is a subject rich in material for a much more eloquent pen than mine to do it justice, and because it is one about which much has been said and written of late.

However, I hope you will grant me your indulgence, and overlook my shortcomings.

In the few remarks that I intend to make, I shall not waste your time with an account of the history of anæsthesia; neither do I intend to weary you with a detailed account of the discovery of chloroform or its preparation; nor shall I enter into a discussion as to the merits, demerits, or practicability of anæsthetics in veterinary science, either from a humanitarian point of view, or the more mundane one of £ *s. d.* These are all things I am well aware you have heard discussed over and over again; and I am convinced you will one and all vote for anæsthetics where indicated and when practicable.

I shall, therefore, try and confine myself to what is of more importance to us, viz., a knowledge of the theory of anæsthesia, the precautions to be taken before administration, the modes of administration, the different stages, the signs of approaching danger, the causes of death, the *post-mortem* appearances, and the means of resuscitation.

Anæsthesia literally means loss of touch. The idea which the word is meant to convey would be more accurately expressed by the term "Analgesia," which signifies loss of sensation. The familiarity of the term must, however, justify its almost universal application.

General anæsthetics are a group of volatile bodies whose vapour has the power of producing unconsciousness to pain and to external impressions. They owe these properties largely to the rapidity with which they are absorbed and again eliminated from the system. They gain access mainly through the lungs, and are for the most part excreted by the same channels.

The term general anæsthesia is applied to the effects of such agents as chloroform and nitrous oxide, in contradistinction to local, as produced by cocaine. Ether has both a general and local action, but the one is in no way connected with the other.

In local anæsthesia, insensibility to pain is produced in a certain part without rendering the animal unconscious to surrounding objects.

Theories suggested to explain the action of general anæsthetics are:—1st, that they produce their effect by

partial arrested oxidation; 2nd, by producing physical changes in the blood; 3rd, that anæsthesia, like sleep, is produced by cerebral anæmia; 4th, that they act directly on the nerve centres concerned in the production of such results.

Bernard says that anæsthesia is due to semi-coagulation of nerve protoplasm, but he brings forward no proof that such is the case. The fourth theory has the most supporters. The only proof of the first is that anæsthetics decrease oxidation, and that in asphyxia there are symptoms similar to those produced by anæsthetics.

The second theory is advanced because anæsthetics do produce some changes in the blood.

The symptoms of asphyxia, however, are only analogous, not identical with those of anæsthesia, and it cannot be proved that the lessened oxidation and blood changes are the cause and not the result of the nervous symptoms. Again, there are drugs such as amyl nitrite, which lessen oxidation, but do not produce anæsthesia; and, in fact, anæsthesia can be produced by too much oxygen in the blood.

As regards anæmia of the brain, it results from suspension of function, and is, therefore, a result and not a cause of anæsthesia; moreover, it has been proved that chloroform acts on the bloodless cerebrum. It has also been shown that in anæmia nerve function is not arrested, while in anæsthesia it is. It must then be concluded that anæsthetics act directly on nerve centres.

There is yet another theory based upon the power which chloroform has of dissolving the stroma of the red blood cells.

This stroma is composed of "Protogon" which is also an important constituent of nerve centres, and Hermann concludes from this that anæsthesia produced by chloroform may act by dissolving the protogon of these centres. Bile acids also dissolve protogon, and Hermann says that they have anæsthetic properties. However, I think this theory is rather far-fetched, as most likely death would have occurred long before this would be affected, and even if it did not, recovery must necessarily be very protracted.

This much I think on theories will suffice, and now I beg to direct your attention to the more practical points.

Administration.

Precautions: Before putting an animal under the influence of anæsthetics, the operator should ascertain whether it is a fit subject. This is done by a careful examination of the

heart, respiratory organs, etc. All animals with chronic heart or lung disease may be considered unsuitable subjects. They should not be administered, at least in the ordinary way, to animals with any obstruction to respiration. If the obstruction be in the larynx, tracheotomy may be performed. and the patient made to inhale the drug through the aperture.

The patient should be in a condition capable of bearing the effects of the operation.

The last meal should be given some hours before operating, as chloroform acts more rapidly on an empty stomach. The patient must not have been subjected to any debilitating influences, such as very hard work or starvation, or it may succumb to the effects of the operation.

Some advise the previous administration of physic. In this I see no great advantage, neither is there much ground for objection, provided the dose is small. In all animals the last meal should be of easily digested food.

If the patient be a large animal, it should first be cast and well secured.

The excitement consequent may give rise to an appearance of jugular pulse, but this is in reality the pulsation of the carotids. The same pulse is seen in the ox in rumination, and must not be mistaken for valvular disease or obstruction.

Some advise the administration of a dose of opium or chloral, or better, a hypodermic injection of morphia some time before casting, with the object of lessening the struggling of the animal during the early stage. The reasons for and against are numerous.

Incomplete anæsthesia is said to be more dangerous than complete. Accidents in this are not, however, due to the drug, but are referable to the shock produced by the operation, the nervous system not being sufficiently numbed to bear it.

Obstruction to respiration by falling back of the tongue is less seen in animals than man, and of course can only occur in the dog. It is indicated by stertor, and can be relieved by pulling forward the tongue. That the tongue may be the more readily got at, it is advisable to remove the muzzle when the animal is past the excited stage, and continue the administration by the open method.

In operations about the face, the use of anæsthetics is said to be dangerous. This is supposed to be due to the near relation of the deep origin of the fifth nerve to that of the tenth (Pilnatory body).

In operations about the mouth and throat it must be remembered that the epiglottis and pharyngeal muscles are paralyzed, consequently foreign matters, as blood, etc., may find their way down the trachea.

Modes of Administration.

Having placed your patient in a convenient position for the operation, you proceed to administer the drug. If by inhalation, your first care should be to lubricate the nostrils, as the vapour, especially of chloroform, may cause vesication of the mucous membrane.

Various muzzles are used to facilitate the administration; none of those should I approve of which do not admit of plenty of air. They certainly cause less waste of the drug, but some of them in my opinion produce anæsthesia as much by not admitting of the free outlet of CO_2 as by the agency of the drug; this of course must be very dangerous to life.

Others again consider muzzles unnecessary, and prefer a simple nosebag with holes in the upper part to admit air. Another method is practised in some parts, viz., per rectum. The mode of procedure is as follows:—A tube is inserted well into the rectum and then connected with a flask containing the drug. The flask is then placed in hot water which causes speedy evaporation, the vapour passing thus into the bowels and is absorbed. One ounce of chloroform is said to be sufficient to anæsthetise a cow if given in this manner. The speediest method is by introducing the drug directly into the blood stream. Fifteen minims of chloroform are said to be enough to anæsthetise a dog if injected into the jugular. This method is, however, so very dangerous it should never be adopted in practice, and deserves but passing mention.

The simplest method of administering chloroform is by using a sponge and towel. The drug is poured on a sponge and applied by the hand to one nostril; the whole is then covered by a towel to prevent the vapour being carried off by the currents of air. It is hardly necessary to state that a draught will interfere materially with the administration. If the sponge be applied to the lower nostril, it will insure the freer admixture of air. The advantages of the sponge over the muzzle are that the mucous membrane can be more easily observed, and that the ministration can be more readily stopped if necessary, also there is a freer admixture of air, and the exhaled air more readily diffuses. If the administrator applies the sponge with one hand, he can take the pulse

at the submax. artery and note the sensitiveness of the conjunctiva with the other.

With regard to the dog the best method is by using a wire muzzle. A piece of sponge is fixed on the nose of a wire muzzle and applied in the ordinary way. The drug is then cautiously poured on the sponge and the whole covered with a towel. If the dog is a small one, it may be put in a deep box covered over with a towel the drug being put in the box on a sponge, or poured on the towel from time to time until the patient is brought under its influence.

Dogs are considered by many to be peculiarly susceptible to the poisonous influence of chloroform, but Professor W. O. Williams states that this is not so if the drug is administered slowly. It should be remembered that in all animals it is advisable to begin by using a small quantity.

Signs of Danger.

Connected with the administration of anæsthetics, there are certain signs of approaching danger which one must know and be able to identify.

1st. *Cough* indicates that the vapour is in too concentrated a form, also that there is spasm of the glottis, which is sometimes caused by the stimulating effect of the vapour, but passes off as the drug begins to produce its central effect.

2nd. *Pulse.*—If the pulse suddenly becomes very quick, weak or irregular, the drug must be at once removed and restoratives applied.

3rd. *Respirations.*—These are very important and generally appear before the signs of failure of the heart's action. If the respirations become shallow and stertorous, the administration should be at once discontinued.

4th. *Conjunctivæ.*—Generally while the conjunctiva responds to the stimulation of the finger no danger is to be apprehended, but if it become quite insensible, administration must be at once stopped.

Some consider the insensibility of the cornea a sign that the animal is fit to be operated on. I am of opinion that anæsthesia should never be pushed so far as this.

5th. *Pupil.*—In the stage of true anæsthesia, the pupil is contracted. If it dilate suddenly, danger is to be apprehended. The phenomena of the pupils are, however, not constant.

The proportion of chloroform to air should be about 4 per cent. of chloroform. In this proportion the heart will continue to beat even afer respiration has ceased; hence there is

a greater chance of the restoratory measures proving effectual.

It may be found advisable to begin with one drug, and continue with another. For instance, the great excitement produced at first by ether, may be obviated by beginning with chloroform. In the same way the depressant effects of chloroform may be avoided by continuing with ether.

The phenomena produced by one drug do not materially differ from those of another. I shall therefore describe them as produced by chloroform.

(*To be continued.*)

UNION OF NERVE.

COMMUNICATED BY JOSHUA A. NUNN, F.R.C.V.S., C.I.E., ARMY VETERINARY DEPARTMENT, LAHORE, INDIA.

THE following two cases of union of the plantar nerves, with return of sensation after neurectomy may, perhaps, be of interest, as there is an exact record of dates:—No. 1, aged Australian gelding, double neurectomy near fore, on 10th November, 1890. Tested after the operation by pricking with a pin; complete loss of sensation. Destroyed on November 8th, 1893. Prior to destruction, tested by pricking with a pin; sensation present. On dissection of limb both branches of the plantar nerve were found united. The specimen is in the Museum of the Lahore Veterinary College.

No. 2, aged Australian mare, double neurectomy on both fore limbs on 21st June, 1893. Tested after operation by pricking with pin; loss of sensibility. Came again under notice 26th April, 1895. Lame from corns both fore feet; tested by pricking with pin; sensation in both feet. In both these cases a full inch or more of the nerve had been excised. Perceval in his Hippo-Pathology, Vol. IV., page 221, states that a mare operated on went sound for two years, when lameness and sensation returned; that a second, three years after operation, was sound; and a third after eight years. Williams' Veterinary Surgery, page 355, states that nerve union, with return of lameness, does not take place for at least two years. Mr. Bowlby, in Christopher Heath's Dictionary of Practical Surgery, Vol. II., page 62, states that if the nerve is merely divided, that a year or more must elapse before union is complete; but he also says: "If there is wide separation of the divided ends, and especially if muscular or scar tissue intervene, union will most likely not occur at all, and in any case will be long delayed. But, though delayed, union may occur

even after excision of as much as two or three inches of nerve trunk." In the *British Medical Journal* of August 5th, 1876, a case is related by Mr. Favell in which, after excision of two inches of the sciatic nerve, sensation was restored by suturing in about a year.

IMPERFORATE ANUS WITH FALSE OPENING.

J. WASHINGTON IRVING, M.R.C.V.S., BRISBANE.

THE following case struck me as being remarkably interesting from the fact, that so far as I can learn, no similar case has been recorded.

The subject, a dark brown hackney mare, 4½ years old, 15.1 hands high, and in the "pink of condition," was brought into the hospital for examination, the owner informing me that she had no proper "backside" (his own word), and that the fæces were passed by the vulva instead of the anus. The owner, naturally, thought this a very strange occurrence.

I may say that the mare had only been purchased the day before at an auction sale, having been brought in with a "mob" of country horses. On lifting the tail the vulva and anus presented an almost normal appearance, the only deviation from the normal being a lack of opening to the anus. On further examination per vaginam a perfectly-formed opening was found on the roof of the vagina connecting this organ with the rectum; through this opening the hand could be passed with ease.

The points I would emphasise are:—(1) the age of the animal (4½ years); (2) the opening into the vagina of an anus perfectly formed; and (3) the fact of the animal being in good condition, the fæces being passed without the slightest inconvenience.

Personally, I should feel gratified if any other practitioners having met with similar cases would give their experiences.

[EDITORIAL NOTE.—A five-year-old mare, bred in Ireland, that presented exactly similar appearances, was subjected for examination to the Editor a few years ago.]

THE EARLY DAYS OF ANÆSTHETICS IN VETERINARY SURGERY—A RETROSPECT.

(*Continued from page* 409.)

BY E. WALLIS HOARE, F.R.C.V.S., CORK.

IN the *Veterinarian* of May, 1847, Messrs. Henderson and Cherry continue their article on "The Effects of Æther." Further experiments are recorded, in which an apparatus is

employed, admitting a proportion of atmospheric air. They arrive at the conclusion that a very large amount of the drug is required to induce a requisite degree of anæsthesia, also that a continuous stream of æther vapour is necessary before the full effect is produced.

Very interesting remarks are also made with reference to the exciting effects of æther on some individuals, these being ascribed by the investigators to the development of the intellectual portions of the brain.

They regard the action of æther as being chiefly exerted on the spinal cord and its branches, paralysing or suspending the functions of these parts; such views, it need hardly be remarked, would not be accepted in the present day as correct.

In the editorial of the same month, we find that although sanguine hopes are expressed of the successful employment of æther in the future, still the editor does not consider the drug either safe or expedient under present circumstances, and ridicules the statement made by Professor Sewell in his report for the Royal Agricultural Society, that "nothing beyond a common soap-dish filled with æther, and held to the animal's nose, is required" to produce anæsthesia.

In June, 1847, Mr. Robert Olden, V.S., Cork, writes an interesting article on "An apparatus for the safe administration of the vapour of æther." He clearly points out the errors that former experimenters fell into, and shows that the case of death recorded from æther, was primarily due to asphyxia. He also states that the mind does become affected by æther, and that nothing short of coma suspends the function of motion.

His apparatus is constructed with an air-tube and a valve so as to allow a proper proportion of air during inhalation, the amount of the drug required being from seven to eight ounces, and time from four to seven minutes, the administration being conducted with the animal in the standing position. A diagram of the apparatus fixed to the horse's head is also given, and instructions with reference to its use, both for inducing anæsthesia as well as for controlling vicious horses. In July, 1847, we find that Mr. Arthur Cherry writes a reply to Mr. Olden and criticises the views of the latter with reference to the physiological action of æther. He also states that the apparatus used and invented by Mr. Olden was long before this employed by himself and other investigators, in fact, a superior class of instrument to the one in question, but the inventor through modesty did not wish either

description or drawing of it to be given for fear of making public imperfect instruments.

This discussion forcibly reminds us of a similar one which was carried on last year in the *Veterinary Record* with reference to the claims for originality of a chloroform apparatus, but which eventually degenerated into an academic discussion on the significance of certain synonyms, and is another example of the veracity of the old adage that "history repeats itself."

In December, 1847, we find the first notice of chloroform in the *Veterinarian*, consisting of an extract from the *Edinburgh Mercury*, describing the application of the drug by Professor Simpson and others, and its advantages over æther.

In January, 1848, an editorial appears on the subject of chloroform, in which is described an experiment with the drug by Mr. Goodwin, V.S., on a horse at the Royal Mews.

The drug was administered by means of sponges and an ordinary leather muzzle, with the animal in the standing position, and held by means of a cavesson.

Violent excitement was produced, the animal reared up, and succeeded in removing the cavesson, bridle, and muzzle off his head.

"At this period the horse had the aspect of one momentarily struck with tetanus. There was the wild, senseless, ghastly stare, the stiff outstretched limbs, the body remaining supported by its hind quarters against the boards."

The above is a graphic description of the action of chloroform when administered to a horse in a standing position, without much air being admitted, and the drug being inhaled in quantity.

This tetanic condition of the muscles and limbs is very characteristic in the primary stages, when a toxic dose is administered.

In the above experiment it is stated that sensation was absent from the surface of the body, but that in consequence of the muzzle having come off, total insensibility did not continue longer than a couple of minutes.

In the same month Mr. Cockburn, V.S., Haddington, performed neurotomy on a horse, under the influence of chloroform, in the presence of several medical men. Two ounces of the drug were poured on a piece of flannel cloth, below which was a sponge, the whole being placed in a tin case, which was tied over the horse's nose, and surrounded by a flannel bag.

In 3½ minutes the animal fell over, and in five minutes it was perfectly insensible.

On cutting the second nerve, the animal made a slight movement, and more chloroform was given, the other nerves being exposed and severed without a quiver.

In 25 minutes from the commencement the animal was again on his legs.

We recommend the above instance to the notice of those who so frequently dilate on the dangers attendant on the administration of chloroform to the horse, and the time and trouble involved in same.

In March, 1848, Mr. Wm. Field contributes an article on "The Effects of Chloroform on Horses."

The drug, in his investigations, was administered by means of a muzzle, with the animal in the standing position. Mr. Field, however, very justly condemns the practice of administering the drug to the horse in the standing position, in consequence of the uncertain manner in which the animal may fall.

In the same number Mr. J. C. Pickering, of York, records a case of castration of a six-year-old thoroughbred horse under the influence of chloroform. A special muzzle was employed and 2 ozs. chloroform used; time, from putting on muzzle to completion of operation, 6½ minutes; in 12 minutes from the time of putting on the muzzle he was on his legs again, walked to his box, and in less than half-an-hour would have fed as well as ever, had he been allowed.

In March Mr. S. Peech gives an unfavourable account of his experience with chloroform, he having employed 8 ounces of the drug to each of two mares for the performance of neurotomy. Evidently there must have been great waste of the drug, or the latter was of very imperfect strength.

In November, 1848, we find an extract from a Belgian medical journal on the "Effects of Chloroform on Animals," being portion of a communication read by Professor Thiernesse, before the Academy of Medicine at Belgium. In this, very favourable accounts are given of the employment of chloroform and æther to horses and dogs.

(*To be continued.*)

INVAGINATION OF THE CÆCUM INTO THE COLON.

BY "HIRUDO."

THE following case of invagination of the cæcum into the colon I am induced to record, because so far as I am aware

it is a rare lesion, and, indeed, the possibility of the blind gut insinuating itself into the colon by turning itself inside out, might very well be doubted by anyone who had not seen such a condition himself or who had not heard of a well authenticated case.

A cab proprietor let out a bay eight-year-old mare to two gentlemen to drive to a neighbouring town eight miles off; during the afternoon a telegram arrived stating that the mare was ill and requesting that another horse be sent to take the fares back home. I accompanied the owner, and about halfway we met the gentlemen coming back. They stated that the mare was taken very ill with colic shortly after their arrival at the town, some medicine was given, and after a time she appeared to get all right. We changed horses and traps, and the cab proprietor and myself came slowly back with the mare. When she got into the stable she appeared to be all right, but after a little time she began to curl the tail, scrape, and finally lay down. I gave her a chlorodyne draught and left her, returning in an hour to find the animal about the same.

I explored the rectum and removed a few softish pieces of fæces. The large bowels were distended with gas, but there was nothing to indicate that so profound an alteration of position had taken place as the *post-mortem* disclosed. Borborygma was entirely absent, the pulse was 50, the artery rather tense, there was no sweating, and the pain evinced was mild; respiration slightly accelerated. The condition of the animal suggested colic from constipation.

I now administered six drams of aloes in a ball, gave injections with oil, went away, returning in two hours.

My patient was now in a far less satisfactory state. She was excited and extremely restless; not in violent agony, but yet in constant pain; she was never still, but was constantly engaged in some manœuvre—scraping, looking round, shaking the head, curling the body, crouching down; sometimes she would go down, but at this time did not lie long. The rectum was empty and formed a cavernous space, the folds of mucous membrane being obliterated.

I remained all night with my patient, during which time she was bled, the abdomen was stimulated, several anodyne draughts and hypodermic injections of morphia were administered, but nothing seemed to have any effect in relieving the pain, which was almost continuous, and at times agonising. The animal died at about four o'clock in the morning. A *post-mortem* examination was held the same day. On opening

into the abdominal cavity the cæcum, which is usually a prominent object, could not be found, and when the colon—which felt as if distended with fæces—was cut into, the mucous surface of the cæcum presented itself, and the whole of that gut was found to be engaged in the colon.

It would appear from this case that the gravest alterations of the relations of the bowels are in the horse compatible with life, and that they may at first occasion only a mild degree of pain. It also shows how difficult it is—if, indeed, it is not impossible—to diagnose the existence of such lesions *intra vitam.*

TUBERCULOSIS IN THE HORSE AFFECTING LUNG, SPLEEN AND LIVER.

BY MR. R. ELLIOTT, V.S., MIDDLESBORO'.

THE morbid specimen forwarded on the 14th, is a portion of the liver of a four years' old cart gelding. I may say the whole of the liver was exactly as the piece forwarded. The spleen was also very much enlarged, in which were several large abscesses, containing about half-a pint of pus each. There was also a large abscess in the lungs.

The subject was purchased by the owners last August, the dam of which was a very good, hardy, cart mare, the sire "Enterpriser," a cart horse, whose stock has the name of being "soft."

The subject of this case was a great, good-looking animal, 17 h.h., well made but slow, and weighed between 16 and 17 cwts. previous to his illness, which was first noticed about nine weeks ago in this way. He took more driving on. If his harness was taken off in the stall, and he was a yard from the manger, he would stand there until forced up to it. Three weeks ago I was called in.

Symptoms:—Pulse 84, temperature 105. Respirations slightly accelerated, v.m.m. slightly infected, and rather yellow, appetite practically suspended, would occasionally eat a little hay or grass, perhaps a carrot; hay tea, he would drink, about three gallons every 24 hours. The temperature and pulse varied, the former from 103 to 106, the latter from 84 to 120. Death took place on the 13th, about 9.30 a.m.

(The surface of the liver was dotted over with whitish nodules, about the size of a small marble. They were slightly raised above the surface. In the substance of the organ they were confluent, and areas more or less large occurred, where the liver parenchymas was replaced by this tumour substance.

When the nodules were cut into, they were found to be made up of firm cartilagenous-looking tissue. This appearance characterized also the areas found in the liver substance. There was no trace of pus or of caseous matter in any of them.

Near where the posterior cava passes through the liver, an abscess, about the size of a man's fist, existed. It contained about five ounces of creamy pus. A cover glass film from this, stained by the Ziehl-Nilssen method, showed great numbers of the tubercle bacillus.)

Cases in Practice.

CYSTIC TESTICLES.

THE following record of an unsuccessful attempt to castrate a rig will show one of the dangers which environ those who perform this operation, and especially those who are determined to get something to remove, testicle or no testicle. The case occurred in the practice of Mr. E. W. Anderton, M.R.C.V.S., Maybole, and the account of it is in his own words :—

An advertising castrator in this district was yesterday (May 23rd) asked to castrate a two-year-old rig. He performed the operation to his own satisfaction, with the result that the next night I was called in to see the animal. I examined it and found that the scrotum had been sewn up with six stiches on each side in such a manner that no pus could possibly escape. With some difficulty I removed some of the sutures, had the parts dressed antiseptically, and administered sodii hyposulphis internally.

On the 26th he took lymphangitis of the near hind leg, and on the 28th he died.

P.M.—Owing to the great mutilation of the parts, a good *post-mortem* could not be made. However, before making any incision through the skin, I inserted my hands into the wounds and grappled first a bowel and then a kidney. On removing the intestines, the specimen I sent to you came out along with them, seeming, as far as I could see, to be suspended in the mesentery. Hoping you can make something from this rambling description, I remain, yours respectfully, E. W. ANDERTON.

The owner's description of the operation is instructive, and shows what courage a plentiful lack of anatomical knowledge may beget.

The case of castration in which you were lately interested took place here on the 23rd ult. The colt (a two-year-old) got no food for twenty-four hours previously; was "cast" in the usual way, each fore and hind leg being bent down and firmly bound together, so that at no time during the work did any of the limbs get free. When on his back an incision was made in the scrotum of the right side sufficient to allow of the operator's right hand being inserted, and gradually brought towards the back till the arm was in fully half way between the hand and elbow. The testicle seemed difficult to find, and after a time the left hand was tried without success;

hands were changed alternately for half an hour, when the organ was supposed to be got and taken away. A similar process was repeated with the other side, and the hand put in about the same length, when, after a search of, say, fifteen minutes, the second testicle was said to be got.

The wounds were dressed with a carbolic preparation, and three or four stitches put in each.

When ropes were unloosed the colt rose slowly, and gave me the impression of being injured with the operation. After being put in the loose box he never fed well, drank greedily, swelled much, especially in the left leg, which latterly increased down to the hock and along the belly, death occurring on the fifth day.

The supposed testicles turned out to be omentum fat and pieces of striped muscle, each weighing about half an ounce and had not the faintest resemblance to testicles. The specimens sent by Mr. Anderton, and taken by him from the abdomen *post-mortem*, consisted of a kidney, which was almost diffluent and could not be hardened for microscopical examination.

The other specimen had, at first sight, the appearance of a uterus. It consisted of a closed sac, the wall blue-grey in colour and fibrous looking.

It was nearly square, and measured about 18 inches each way. It seemed to contain a number of large, hard, rounded masses. On cutting into the sac, these rounded objects were found to be adherent to the wall. They each consisted of a membranous covering, containing a structure resembling a testicle, fused to a mass of cartilage and bits of bone, and two or three smaller rounded masses, some filled with curled hair, some with myxomatous tissue, some with a cheesy material.

PERFORATION OF THE URINARY BLADDER.

BY MR. M. J. CLEARY, M.R.C.V.S.

MULLINGAR,
June 11th, 1895.

To the Editor of the VETERINARY JOURNAL.

DEAR SIR,—Yesterday evening I sent you a bladder (or, rather, portion of a bladder), which was taken from a three-year-old bullock, the history of whose death is: I saw the animal three weeks ago, and at that time he had been two days ailing, and, having received a dose of Epsom salts previous to my arrival, he was purging at the time. *Symptoms*—(1.) Had never previously been unwell; (2.) Slightly swollen, and inclined to lie down; (3.) When put on his feet he would jump about and raise his hind legs very high, and would at intervals moan, as if in pain; (4.) His temperature normal; (5.) Ate and drank well during his entire sickness; (6.) He tried to micturate very often, but was unable, nevertheless, the water came continuously away from him drop by drop; (7.) Examined him per rectum, and found the bladder pretty full. *Diagnosis*—Inflammation of the kidneys. *Treatment*—Lapative food, and tincture of hyoscyamus every six hours. I did not see the animal any more, but he gradually grew more swollen till he obtained an enormous size,

and died about the tenth day after my visit. The owner opened him, and he informed me that, on cutting into his abdomen, at least twenty gallons of urine made its escape. He brought me a kidney which he thought (wisely so) was diseased, and also the bladder.

The bladder had a perforation in it (where I put the twine), which occurred ante-mortem, and from which the urine escaped. The kidney (which fell into the possession of a dog, or else I should have sent it to you), was inflamed and contained a large quantity of lime-salts in its pelvis. I am inclined to think that some portion of the calcareous matter got into the urethra, and consequently prevented the usual flow of urine from the bladder. But apart from this the bullock would have died, as the hole in his bladder would eventually have killed him. I would thank you very much for your opinion regarding the pathological condition of the wall of the bladder, and as to what might bring about the perforation. The calcareous depositions could hardly account for it. Wishing yourself and your father my very best respects, I remain, faithfully yours, M. J. CLEARY.

THE hole in the bladder referred to by Mr. Cleary was evidently of *ante-mortem* origin. It looked as if punched out, the edges were swollen and puckered and the surface round about it was hyperæmic and covered by an inflammatory false membrane. It is probable that the condition arose from the irritation set up by a calculus, very likely one with an irregular surface, and perforation resulting from the consequent necrosis. A perfectly similar case has been recorded as occurring in a bullock, and on opening its abdominal cavity several washtubfuls of *urine* were collected, and here also a perforation of old standing was found in the fundus of the bladder.

LYMPHADENOMA OF THE SPLEEN AFFECTING THE HORSE.

A SPLEEN of enormous proportions was sent to the College by Mr. Bowes, M.R.C.V.S., Leeds, who found it in a knacker's yard, but unfortunately no history of the case and no account of the condition of the other organs was obtainable.

The spleen weighed close on eight stones, was very firm and resistant in consistence. The surface was irregularly studded with eminences, some as broad as the palm of the hand, but not raised much above the surface. On section, the cut surface showed numerous yellowish patches, and the splenic pulp around was darker than normal.

A piece hardened in paraffin and sections stained with hœmatoxylin, rubin and orange, and other sections stained with picrocarmine showed that the disease was lymphadenoma. The adenoid sheaths were greatly increased and were fibrous; the trabeculœ crossed the field as coarse thick bands. In the pulp there was noticed a great increase of the

lymphoid tissue, and at the same time a marked decrease in the number of lymph elements; in some places they indeed seemed to be absent, and the whole of the tissue was a mass of branching cells.

DEATH OF MR. PETER TAYLOR, F.R.C.V.S., MANCHESTER.

WE regret to announce the death, which occurred suddenly on 13th June at his residence, Torkington Lodge, Cheadle, of Mr. Peter Taylor, the chief partner in the firm of Messrs. Taylor and Sons, veterinary surgeons, of Manchester, and was one of the best-known men in his line of business in Lancashire and Cheshire. Mr. Taylor rose to dress as usual shortly after half-past seven o'clock with a view of going to business at Manchester as usual. Whilst in the act of dressing he was seized with illness, which at once prostrated him. Dr. John Godson was immediately called in, and was at first hopeful that his patient's case would yield to treatment. The attack was apparently, however, of a more serious character than the doctor had diagnosed, and about half-past eight o'clock Mr. Taylor passed peacefully away. Mr. Taylor was F.R.C.V.S., and for nearly 50 years has carried on a lucrative business at 2 and 4, Brick Street, Turner Street, Manchester. Year in and year out, whatever the weather, he drove regularly from and to Cheadle, his face and conveyance being perhaps the best known of any that used the road. He stood high in his profession, and was very much esteemed in the locality which for many years he has made his home. During the vicarate of the Rev. P. M. Herford, Mr. Taylor was churchwarden of St. James's, Gatley. His loss will be keenly felt in the country as well as in the town, and the deepest sympathy is on all sides expressed with the widow and family, six sons and one daughter (Mrs. B. H. Bindloss), all grown up, in their sad and bitter bereavement.—*Stockport Advertiser.*

The late Mr. Taylor was the first and only President of the Mutual Benevolent and Defence Association, and he was also President of the Lancashire Veterinary Medical Association. All veterinary associations received his warmest support, and as a member of the Council of the Royal College of Veterinary Surgeons for many

years, all measures calculated to promote the welfare of our profession had a very zealous advocate and supporter in him. The profession has sustained a loss by the death of Mr. Peter Taylor. His force of character and rectitude of purpose commanded the respect of all who came in contact with him. His large circle of friends, which comprised a large number of his professional brethren, deeply mourn his loss.

VETERINARY LT.-COLONEL C. PHILLIPS.

WE learn with much regret of the death of Lt.-Colonel C. Phillips, F.R.C.V.S., Army Veterinary Department, at the early age of forty-four.

This distinguished officer joined the Royal Horse Artillery in 1870, when only nineteen years of age. Soon after entering the service he was ordered to India, where he remained for more than seven years. During this time he distinguished himself by his enthusiastic devotion to his professional duties. His skill and promptitude in India most materially aided in suppressing some very severe outbreaks of contagious disease.

This zealous officer, after only a short stay at home of six months, was selected for active service in South Africa during the Zulu campaign; and in that war he was mentioned in despatches and gained the medal and clasp. After this he returned home, and among other stations served at Edinburgh. At this place he formed a large circle of friends, whom he attracted by his charming social qualities. We knew him as a practitioner of a high order, whose opinion was always valued, being based on the careful observation of clinical facts. He was elected President of the Veterinary Medical Society of Edinburgh; and those who were privileged to attend the deliberations of this Association during his tenure of office could not fail to appreciate the courtesy and tact with which he presided.

In 1884 he was again selected for active service in the Nile Expedition, and was once more mentioned in despatches. At the end of the campaign he was specially promoted to Veterinary-Major for meritorious service in the field, and received the medal and Khedive's star. He remained in Egypt as Principal Veterinary Surgeon in that country until 1888.

On his return home, he was attached to the 13th Hussars, and remained with that regiment until February, 1894, when he was promoted to administrative rank after only twenty-four years' service, and became District Veterinary Officer for Ireland.

In Dublin he devoted almost his entire time to his official duties, and it is feared that his health suffered in consequence. An attack of influenza, from which, under more favourable circumstances, he might have recovered, led to complications which proved fatal on the 14th June, 1895. The army has lost one of its most brilliant officers, and the Army Veterinary Department one of its most promising administrators.

Those who had the privilege of knowing him intimately have lost a sincere and genuine friend.

Proceedings of the Royal College of Veterinary Surgeons and Veterinary Medical Societies, etc.

ROYAL COLLEGE OF VETERINARY SURGEONS.

THE ANNUAL MEETING.

THE Fifty-second Annual General Meeting of the Royal College of Veterinary Surgeons was held at noon on Wednesday, the 5th ult., at the College building, 10, Red Lion Square, Bloomsbury, Mr. W. Hunting, the President, occupying the chair. The attendance included:—Sir F. FitzWygram, Bart., M.P., Messrs. F. W. Wragg, W. J. Mulvey, J. F. Simpson, J.P., J. Lawson (Manchester), R. C. Trigger, A. W. Mason (Leeds), J. Abson (Sheffield), J. F. Bell, A. L. Butters, J. Hutton (Kelso), J. Ward, E. Faulkner (Manchester), J. S. Hurndall, R. Rutherford (Edinburgh), W. Bower, P. McOnie, A. Gibson, H. A McCormack, H. Kidd, F. Stevens, H. Singleton, J. R. Green (Alfreton), H. G. Rogers, Professor J. Macqueen, Professor Shave, Professor Hobday, Messrs. F. W. Kendall, W. Reekie, F. L. Gooch, J. G. Parr, C. Hunting, J. A. W. Dollar, J. H. Brown, senr., J. Douglas, H. Ebsalft, J. Carroll, A. E. Gostling, J. Legg, H. Jacobs, A. J. Owles, Nicholson, Almond, J. Rowe, J. F. Barford, R. Roberts, and H. W. Hooper.

Admission of Reporters.

The CHAIRMAN: The first thing to which I have to call your attention is the fact that some representatives of the press, seeing an announcement of this meeting, have come here, and are waiting below to know whether they will be admitted. I desire to ascertain your feeling in this matter. There is, I think, one precedent, if not two, for the admission of reporters, but it has not been the rule to have them here, and therefore I do not care to admit them without your sanction.

On the motion of Mr. MULVEY, seconded by Mr. BELL, the gentlemen of the lay press in attendance were admitted.

The Minutes.

Mr. FAULKNER, assuming that the minutes of the preceding annual general

meeting had been printed in the various veterinary journals, moved that they be taken as read.

This was seconded by Mr. KIDD, and adopted.

Council Election.

The SECRETARY (Mr. A. W. Hill) then read the list of successful candidates for nine vacancies on the Council, which was as follows:—Mr. W. Hunting, 789; Mr. Locke, 650; Professor W. Owen Williams, 629; Mr. C. Hartley, 622; Professor Dewar, 578; Mr. Beddard, 531; Professor Pritchard, 525; Mr. Bower, 489; and Mr. Barrett, 487.

Mr. TRIGGER moved a vote of thanks to the scrutineers for their kindness in conducting the poll.

Mr. MULVEY seconded the proposition, which was carried unanimously.

The Annual Report.

The CHAIRMAN: The next business is to receive the annual report of the Council for the year 1894-5. I know you have all had a copy of it. If, however, you wish the Secretary to read it, he will do so.

Mr. TRIGGER: In order to bring it under discussion I move that the report be received.

Mr. BELL: I second the motion.

The CHAIRMAN (after a pause): Perhaps some gentleman will move that the report be adopted, as nobody appears to have anything to say.

Mr. SIMPSON then proposed, and Mr. GOOCH seconded, the adoption of the report.

Mr. WARD said that it seemed to him the new Register, embodying the new rules for the four years course, had simply been issued because the Act of Parliament required the revision and correction of the Register. In its altered condition the Register was no doubt of more value to students and, perhaps, to parents and guardians; but, as regarded the great bulk of the profession, and especially the purpose it was intended to serve, the Register was—to say the least—an untrustworthy production. As such he thought it reflected discredit upon the gentlemen who were responsible for the issue. If there was one duty more than another incumbent upon the Council he thought it should be the accuracy and completeness of the Register. It afforded the only legal evidence of a man's right to call himself a member of the Royal College of Veterinary Surgeons. If a practitioner's name was not correctly entered in the Register or was omitted from it, he lost the privileges of his profession. That he (Mr. Ward) thought was a very important thing. Hence he held that it was one of the principal duties of the executive of the College to attend to the Register on behalf of the generality of the members. He did not know who was to be censured in this matter, whether the person blameable was the President or the Secretary, or whether the whole Council was at fault and deserved to be censured. He did not think they should hide themselves and seek to escape behind a sub-committee. He thought that one reason why the Council were indifferent as to the Register was the fact that it did not pay. It was said not to pay, and that there was a loss of between £40 and £50 in regard to its publication. However that might be, his belief was that eight-tenths more books were ordered than were necessary or were sold. That would account somewhat for the loss incurred, but if the expense of issue was double what it was, seeing that the Register was the legal basis of their privileges, it was the bounden duty of the Council to make the book as accurate and complete as possible. That was a duty they owed to every member of the profession. In the present Register certain practitioners were described as being "deceased" who were still alive and exercising their calling. Quebec

was described as situated in South America, and Whitechapel was located in the Parish of Kennington. And there were other similarly absurd mistakes: in fact, he believed their President was conscious of nearly 500 blunders. Nor were these printer's errors, but mistakes known and uncorrected before the "copy" was delivered to the printers. He thought that the President had remarked that "it didn't matter whether the book came out right or wrong so long as it was published." That was not his (Mr. Ward's) opinion. He contended that the Register, when printed, should be as correct and complete as possible.

Mr. HURNDALL said he noticed on the credit side of the balance-sheet the item "Law charges, £212 1s.," as to which he desired to have some further explanation. He wished to know what proportion of those charges was expended in prosecuting registered shoeing-smiths who had offended against the Veterinary Surgeons Act. Then he observed a delightfully vague sort of paragraph in the report relative to "The Registration of Farriers." It would be very satisfactory to those who, like himself, had opposed this examination of farriers, to know the kind of examination to which the farriers were subjected. It was within his knowledge that a number of men had passed who were utterly unfitted for the position of farriers. The report said that registration was "only obtained after a practical test of the candidate's ability to make shoes and shoe a horse, and, after an oral examination, testing his knowledge of the construction of a healthy foot." That was a very vague sort of statement. Well, a number of members of the veterinary profession felt that this College should be dissociated from the joint committee conducting these examinations, a committee consisting of representatives of the Worshipful Committee of Farriers, of the Royal Agricultural Society, and the Royal College of Veterinary Surgeons. A special meeting of the profession was called and passed a resolution against the College continuing to countenance these examinations. The resolution was ignored, but he thought the members of the College were entitled to a fuller explanation than the paragraph he had read contained. He asked the President or the gentlemen who had undertaken these examinations to give the meeting some idea of the sort of tests to which farriers presenting themselves for examination were subjected. Some members of the Council had treated the resolution of the special meeting of members—the only special meeting which had ever been called—in a light-handed manner, simply because the meeting was sparsely attended. The paucity of attendance, he contended, did not detract from the importance of the resolution adopted, and which seemed to have been ignored entirely. To speak plainly, he thought the Council, having regard to this resolution, should have taken steps to prevent any representative of that College serving in future on this Farriers' Registration Committee. The Council had a distinct view of what the opinion of the profession was in this matter. It did not suit the Council, however, to adopt the course he had suggested as proper in the circumstances, but they simply went on ignoring the resolution, and acted as though no trouble had been taken in convening a meeting and ascertaining the views of the profession on the subject. He asked for some little further information on this matter, and also what proportion of the £212 expended on legal charges was disbursed in prosecuting registered shoeing-smiths who had offended against the Veterinary Surgeons Act.

The CHAIRMAN: I take it you will not expect me to answer you just now. I will wait until I can answer all the questions at once.

Mr. HURNDALL: Whatever you like. I daresay you will suit your own convenience in this as well as in all other matters.

The CHAIRMAN: I will try to.

Mr. R. RUTHERFORD said it might be thought that occupying, as he did, an

official position in the College, his mouth was shut; but he was not going to allow his official position to override his rights as a member of the profession, and to refrain from saying what he thought of some of the contents of the report. He begged to draw their attention, first of all, to the paragraph which said, "The system of marking adopted at the examinations has been altered. In place of the terms 'very good,' 'good,' 'sufficient,' 'bad,' the Council has decided that numbers shall be used. The maximum is represented by 100, and a minimum of 45 per cent. is required to qualify for a pass." Now, why in the name of wonder the Council had thrice, in the last ten or twelve years, altered the system of marking just when the system last adopted was getting into good working order was "one of those things," as Lord Dundreary said, "that no fellah could understand." He, for one, particularly failed to see where the advantage of numbers over the old system came in, and he did know that the former plan had many disadvantages, some of which, he was sure, were never anticipated by the Council when they framed their new rule. He could not conceive of a better system of marking, or one which more readily described a man's sense of another's mental condition than the use of the words "very good," "good," "sufficient," "bad." He denied that an examiner could so correctly assess and gauge the capacity of a student as to pass him with 45 marks and reject him with 44. Speaking of the examiners collectively he asserted that they were quite satisfied with the old system. As practical veterinarians it was much easier for them to say that a man was "good," or "sufficient," or "bad" than to assess him by numbers which conveyed a very poor idea of a man's position as a student. Passing to another part of the report, he read that there were 33 complaints against members of the College or registered practitioners for "unprofessional advertising." Now this phrase was one of those beautifully ambiguous phrases for which the Reports of the Council of that College was celebrated. This was another instance of what was often said, namely, that there was not a single bye-law or regulation of the College through which a coach and six could not be driven, or which might not be turned upside down. What was meant by "unprofessional advertising"? In his ignorance, he had always thought that all advertising was unprofessional. What was professional and what was unprofessional advertising? If there was such a thing as unprofessional advertising, it logically followed that there must be a kind of advertising that was professional. If the Council meant that a young man who had passed must make a livelihood, and be allowed to this end to circulate a business card, why did they not plainly say so? If the Council meant, on the other hand, that practitioners might advertise in the columns of newspapers, amongst the list of horse sales, that they were this, and that, and the other thing, then why did not the Council say so also? They must not deal in ambiguities. There was a worse offence than unprofessional advertising, and that was solicitation, which was becoming quite common. They had solicitation in Edinburgh, he was sorry to say. They had had a remarkable outbreak of it within the last five or six months. In a paragraph in page 5 of the report it was said, "The new Register, during the past year has undergone many alterations and revisions, and contains the new rules and regulations regarding the four years' scheme." Now he had often heard that there were a large number of unemployed literary men in London. Might he suggest that in charity one or two of those men should be called in to revise the new register, so that it might be turned out a little grammatically, and in such a manner that one rule should not be found to override another. He thought the rules—many of which were impracticable and unworkable—might be cut down to one third their present extent. Turning to the balance sheet on the last page of the report, he found that "delegates expenses" amounted to £72 0s. 4d.

This was the cost incurred by the present system of constantly ascertaining what went on at the examinations. Was the game worth the candle? He asserted that it was not. He had seen the delegates who attended the examinations in Edinburgh from London. They were very nice gentlemen who went about their business in a very quiet sort of way, but whether they rendered services to the College worth £72 was a question he was inclined to argue. He did not assess the value of their services at 72 shillings. In the present financial position of the College, and seeing that they would have to face a diminished income for the next few years, he thought that this expense was one which might well be dispensed with. He did not see the necessity for any expenditure of the kind.

Professor MACQUEEN said that while previous reports of the Council had evoked his complaints, he must say that the present production met with his sympathy and satisfaction. He rose for the purpose of calling the attention of the meeting to an entry on the third page of the report; under the head of "Prize Funds" occurred this paragraph:—"The Jubilee Memorial Fund collection, in commemoration of the year 1894, and of the petitioners for the original Charter of Incorporation, is not yet closed. Subscriptions are still coming in, and the Council believe that after paying for a suitable mural tablet in the College building, a handsome balance will be available for the establishment of some kind of annual prize.' Why the word collection?" It was not a Jubilee Memorial collection. It was never intended to be a collection. "Subscriptions are still coming in," say the Council, "and the Council believe that after paying for a suitable mural tablet in the College building, a handsome balance will be available for the establishment of some kind of annual prize." He would remind the Council that on the 28th November, 1894, Mr. Trigger, the Chairman of the Memorial Committee, submitted to the Council a resolution which the Council confirmed. He would read a resolution because it showed at once that the description of the so-called "collection" was not in accordance with the fact. The resolution was:—"That the memorial take the form of a scholarship or bursary to perpetuate or recognise the services of the gentlemen concerned in the inauguration of the Royal College of Veterinary Surgeons. Now, why should this undertaking be so rudely pushed on one side by the Council in its annual report? That might be the fault of the Publication Committee; it was apparently the fault of some one. As the secretary of the memorial movement, he objected to its object being misrepresented. The misdescription might, he was willing to allow, be the result of an oversight. At the same time he thought it was necessary for him to call the attention of the Council to the matter, and to remind them of the undertaking they adopted. If subscriptions were not coming in quite so quickly as one might expect, it was because the Jubilee Memorial was not very well advertised. If they could obtain the assistance of the veterinary press, if they could secure the aid of the executives of the Jubilee Memorial Committee, there was not the slightest doubt but that the members of the profession would contribute, and it was principally to call attention to the omission of many members of the profession to contribute that he spoke on that occasion. Mr. Rutherford complained of £72 being paid for delegates expenses. As he (Professor Macqueen) read the report the expenses were for a "delegate's" expenses, and if that was the cost of a single delegate he thought it was a most expensive luxury, and that it was advisable to dispense with his further services.

The CHAIRMAN pointed out that the apostrophe should have come after the "s" and not between the "e" and the "s." This was a printer's blunder. Delegates and not delegate were meant.

Mr. PARR complained that so scanty a reference appeared in the report to

the subject of the relations of the veterinary profession to the Board of Agriculture which, according to the veterinary journals, was one of the most important matters that affected the profession. The report after stating that the Council had sent their protest to the Board and had received a reply which "answers no question raised," apparently left the matter there. Were they going to let it rest there? This was just one of those things in which the Council should have taken the initiative, and not awaited the reception of resolutions from veterinary medical societies before acting.

The CHAIRMAN: If no one has anything further to say I will endeavour to answer one or two questions which have been put to the Council.

Mr. Ward told us that the Register ought to be correct and complete, and he blamed the Council for its not being so. Well, we agree with him that it ought to be, and we are only too sorry that the members of the veterinary profession will not permit us to keep it either complete or correct. You will be surprised to know that when we sent voting papers out we had 200 of them returned this year marked "gone away," "address not known," or something of that sort. Now in those 200 cases we know what to do, but there are plenty of others who only turn up when they are described in the Register as "dead" or who, if omitted, write protesting against their names being left out, some two or three years after we have been told by their friends that they have shifted. In the face of such facts as these, I ask how is it possible to keep this Register correct. One way gentlemen may help us, and that is by informing us of the incorrect particulars of which they are individually aware. Complaints sometimes arise because a member of the Conncil tells us of the death of an old friend and the latter is put in the list as "deceased." The old friend writes an abusive letter to say that he is not dead.

Now as to the law charges amounting in the aggregate to £312, Mr. Hurndall wants to know what proportion of those charges had been spent in prosecuting registered shoeing-smiths? Not twopence. There has not been a single shoeing-smith prosecuted, but there is a prosecution pending against one registered farrier. It may interest you to know that for using the words "veterinary shoeing forge" there have been fifteen complaints and only one out of fifteen men complained against is a registered shoeing-smith. Now,—I am going to say something more, but there is a good old proverb which says "Let sleeping dogs lie."

Then we are asked to give particulars as to the sort of examination passed by registered shoeing-smiths. We have nothing to do with the nature of the examination. The annual report before us is only a report of what the Council have done.

Mr. Rutherford finds fault with the system of marking now adopted. Well, it has been pretty thoroughly discussed, has been agreed to by the Council, and the examiners. Mr. Rutherford also illustrates his arguments by pointing out the difficulty of determining whether a student should be rejected simply because he failed to get 44 instead of 45 marks. Well, it might be rather hard to reject that man if he had done well in other respects, but a line must be drawn somewhere in every system. Even when an examiner had to draw the line between "good" and "bad" in his own mind he must draw it somewhere. We thought that when numbers were used instead of words, and the examiners had to mark every paper and every student, the examiners would be much more careful, and therefore the examination would be fairer to the student. When an examiner has to mark numbers instead of "good" or "bad" or "indifferent" he is much more careful, if he does his duty. Of course a personal equation comes in here as in everything human. An examiner may be a very good examiner and yet perhaps not possess quite as much common sense as he might have. That we cannot help. We endeavour to select the best men, and one of their

attributes is common sense if we can get it. Mr. Rutherford complains of one sentence in the report being ambiguous, and another gentleman said something about the ambiguous phrases used by the Council which he should like clearly defined. Well, so would we. We should like everything clearly defined if we could get it, but we are much too wise to try and do it. I think it was Sir Wm. Harcourt who the other day said, "Do not try to give a definition of anything." I would add to that, "Don't try to define anything too correctly." If you try to define precisely what are and what are not offences against the Veterinary Surgeons Act, some day you would have exactly the same complaint which Mr. Rutherford has made in reference to the difficulty of determining whether a man should be rejected with 44 marks and accepted with 45. Everybody who wanted to do wrong would (given a precise definition) go as near the edge of the offence as possible. Hence we should be in no better position than now. Let us leave it indefinite. I think there is a considerable amount of virtue in mystery. There is nothing more impressive than mystery, and so let us leave this matter as mysterious as an Act of Parliament can make it.

Alluding to the expenses of delegates, one gentleman said he did not consider the services of those gentlemen were worth 72 shillings, to say nothing of £72. Well, I do not know. Remember one thing, and that is that we have no examiners on our Council now. We did away with that dual appointment. Having no examiners on the Council, it is necessary for members of the Council in some way to make themselves acquainted with the method in which the examinations are conducted. Perhaps you would let them travel at their own expense. That is kind of you, but if you want your work well done, and expect men to come up to London—400 or 500 miles—10 or 12 times a year, and expect them to spend one or two days attending the examinations in Edinburgh, the least you can do is to pay their railway fare; and that is all we have done.

I am very glad to note that Professor Macqueen describes the report as giving him general satisfaction. He will pardon me for saying that when a report affords him general satisfaction, it ought to yield satisfaction to everybody else in the room. However, not to be outdone, he had to find fault with something, and therefore he tells us how basely, or shamefully, the Council had treated the Jubilee Fund Committee. I wondered what was coming. I thought the Professor was going to describe something dreadful. Then it appeared that the gravamen of our offence was that we had described the object of the movement as the award of an annual prize. Nothing of the kind was intended by the supporters of the movement, said Professor Macqueen. The idea approved was to have a scholarship or bursary. I am not prepared to say what is the difference between a scholarship or a bursary and an annual prize. Not knowing this, and pleading guilty to the general ignorance which pervaded the Council on the subject at the time they drew up this report, I will pass from the matter by offering Professor Macqueen an apology, and by remarking that the offence was unwittingly committed.

Much to our astonishment, Mr. Parr accused us of not doing our duty in relation to the Board of Agriculture, and he asked what had we done. Well, we formed a committee and prepared a report, and a report on this subject was not written in five minutes. We sent the report to the Board of Agriculture, and got a reply. We have besides sent copies of our report all over the kingdom, we have sought the aid of Members of Parliament, and we have done a number of things. But, Mr. Parr, as a business man will not, I am sure, desire the Council to publicly show their hand and say what they are going to do. We have reserved a little up our sleeve against the big fight which will doubtless ensue when the civil service estimates are considered.

Well, gentlemen, I think having answered all the questions put, I will now submit the motion.

The motion for the adoption of the report was then put and carried unanimously.

The CHAIRMAN intimated that a dinner was to follow in the evening at the Holborn Restaurant, to which he invited as many gentlemen as could possibly attend.

On the motion of Mr. FAULKNER, seconded by Mr. REEKIE, a cordial vote of thanks was accorded the Chairman, with which the meeting ended.

The dinner held in the evening was largely attended and successful. Mr. Hunting presided.

In the list of successful candidates from the New Veterinary College the name of Mr. W. M. Ogilvie should appear as having passed the B examination.

THE CENTRAL VETERINARY SOCIETY.

THE usual monthly meeting of the Society was held on Thursday night, the 4th April, at the Royal College of Veterinary Surgeons, 10, Red Lion Square, Bloomsbury, Mr. S. Villar, the President, occupying the chair. The other Fellows present were:—Messrs. A. L. Butters, Vet.-Capt. E. R. C. Butler, A.V.D., Joshua K. Bruce, Alfred Broad, H. W. Caton, Jno. A. W. Dollar, Henry Edgar, Henry Gray, Prof. F. Hobday, W. Hunting, G. C. Lowe, C. Lowe, Profs. J. Macqueen, J. McFadyean, F. C. Mahon, Hon. Sec., J. H. Manton, W. J. Perryman, Professor J. Penberthy, R. Porch, Charles J. Reakes, F. H. Ridler, A. Rogerson, H. G. Rogers, J. Rowe, Hon. Treasurer, F. G. Samson, Hugh Singleton, J. E. Tooth, F. Wragg, J. Woodger. Visitors: Messrs. A. Bury, F. Dowell, G. E. Cawford, C. Dimmick, Morgan Evans, V. Gazi, Osborne J. Hills, F. King Shaw, G. H. Kitchin, H. M. Lenox Conyngham, F. B. Lowe, E. W. Parks, F. Richardson.

On the motion of Mr. H. W. CATON, seconded by Mr. F. G. SAMSON, the minutes of the preceding meeting were taken as read and were confirmed.

Absentees.

The HON. SECRETARY (Mr. F. C. Mahon) announced the receipt of communications intimating the writers' inability to attend from Mr. B. Freer, of Uppingham, Mr. J. Roalfe Cox, Mr. A. Prudames, Mr. J. S. Hurndall, and S. H. Slocock. He also read a letter from Mr. W. Perryman, 50, South Lambeth Road, S.W., thanking the Society for having elected him a member.

New Members.

A ballot resulted in the unanimous election of the following gentlemen:—Messrs. Ridler, M.R.C.V.S., Silver Street, Notting Hill, W.; John Baxter, Horse Department, G.N.R., King's Cross; E. M. Jarvis, South Kensington, S.W.; Harold Sessions, M.R.C.V.S., Dyke Road, Brighton.

"GLANDERS."

Resumed Discussion on Professor McFadyean's Paper.

Professor MACQUEEN said: Mr. President and gentlemen, unfortunately I did not take the opportunity of taking notes while Professor McFadyean was delivering his address, and I hardly think that the summary presented to each of us (a printed summary distributed among the members) gives a fair abstract, or sufficient abstract—for my purpose at least—of the address to which we had the pleasure of listening. But, in the remarks that I wish to

make, I shall have to confine myself to the statements made in the summary; and that, perhaps, will be quite sufficient to enable me to comply with the rules of the Society, the precedent of discussion, and the discipline of debate. The first point to which I should like to direct your attention is the history of glanders—not so much the history of glanders in other countries but the progress of the disease in this country. I should like to know whether glanders is on the increase, whether it has increased within recent years, or whether it is gradually disappearing. I can only obtain returns up to 1890, and apparently the disease was on the increase up to that year. That was, of course, before the days of mallein. The returns since 1873 have dealt with farcy as well as glanders. Until 1873 farcy was not recognised as a contagious disease, so that, in estimating the number of cases, one requires to add the farcy cases to the glanders cases, and the numbers work out in this way: In the sixteen years—that is, from 1874 to 1899—there were 14,506 fresh outbreaks of farcy and glanders, and 22,629 horses attacked. The largest number of horses attacked in any one year was 1346 in 1880. Coming to 1890, I find the number of horses attacked in that year is 1808. That includes farcy and glanders. The fresh outbreaks in 1890 are 951. Now, perhaps, Professor McFadyean can inform us if the number of horses attacked and the number of outbreaks have increased or diminished since 1890. I notice that the essayist refers to the early opinion regarding the disease being contagious. There is no doubt that glanders was considered a contagious disease in very early times. In addition to the observers or authorities mentioned by the professor, I find some five or six others, and they all apparently strongly believed in the contagious nature of glanders. There are, besides, Solleysel and Bourgelat, Gohier, Volpi of Milan, Delwart, Vitet and Dutz, all of whom maintained that the disease was contagious. Our own countryman, White, in 1837, strongly maintained the contagious nature of glanders. Lafosse was doubtful as to the contagious nature of glanders, maintaining that it was sometimes contagious, while at other times it was not. Coleman, whose teaching is no doubt responsible for a good deal of error regarding glanders, did not believe in the contagious nature of the disease. Then there is Percival, to whose books I might refer you for, perhaps, the best history—the best account—of glanders that has been written up to the present time. I do not refer to recent researches in pathology but to the history of the disease, which is detailed at considerable length. In one volume there are no fewer than 200 pages devoted entirely to the history and contagion of glanders and farcy. As to the cause of glanders, I believe it is no longer disputed, but there are probably some contributing causes which are worth remembering—contributing causes that are often summed up in the word "susceptibility." I should like to hear the essayist's opinion regarding "susceptibility" in relation to glanders; whether he believes excessive work or insufficient food, or food of a poor quality, or defective stabling is a contributory cause? I am very much inclined to think that a great many cases of glanders originate in dark stables where defective drainage and ventilation are well marked, where susceptibility is almost beyond question. Then the essayist says that the glanders bacillus may reach the blood, and that "it was doubtful whether it could be detected in the secretions or excretions; and, although it doubtless at times reached the blood current, there were reasons to believe that it does not long retain its vitality there."

Professor McFADYEAN: I do not think I have said that, Professor Macqueen.

Professor MACQUEEN: I am quoting the last paragraph in the summary before the paragraph headed "mode of infection."

Professor McFADYEAN: I said that it (the bacillus) did not long remain there (in the blood current).

Professor MACQUEEN (continuing): I wish simply to recall to your mind some experiments performed by Cadéac and Malet on the infectivity of the blood. They succeeded sixteen times in transmitting glanders by inoculations of the blood of glandered horses, and they failed thirty-five times. Then the next point in the summary is that the detection of the bacillus in secretions or excretions, is doubtful. Now, this is rather important, and I hope you will excuse me if I try to draw some attention to it. If the bacillus is doubtful, if it cannot be detected in the secretions and excretions of a glandered horse, how does infection occur in cases of occult glanders, by which I mean those cases of occult or latent glanders where there is no discharge, no submazillary swelling and no external symptoms; where there is nothing to indicate the presence of glanders until the horse is subjected to a mallein test, and a *post-mortem* examination reveals tubercles in the lungs. My point is this: Is a horse with only tubercles in the lungs a dangerous animal in a stable? I want to know what Professor McFadyean thinks; whether he thinks that such a horse can communicate the disease to another horse. Another question on the point I should like to put to the Professor. At what stage of the disease do the lung lesions become infective? and in order to simplify the question a little I should add that I mean at what stage of the lesion is it capable of giving off the bacillus or that infective material which is exhaled or passed out by the glandered horse, and how long may an animal affected with occult glanders continue in contact with a healthy one without danger to the healthy? If a horse with no external symptoms of glanders is not a dangerous horse in a stable otherwise healthy, then it becomes a question whether occult glanders is quite of that importance that we have all along thought. There must be many horses which do not show any symptoms—neither nasal discharge nor ulcer nor submaxillary swelling—and which yet contain glanders tubercles in their lungs; and I want to know if such horses are capable of infecting others in the usual way? The vitality of the virus is another question as to which I desire information. I have no recollection of Professor McFadyean touching the point in his address, but my calling his attention to the omission may be forgiven if he will complete his statement and tell us about the vitality of the virus, because it has rather an important bearing upon the suppressive measures to be taken after an outbreak.

The next question is the radius of infection. I should like to know how far off a healthy horse may stand harmless from an infected one; whether a healthy horse, before it can be infected, must come into actual contact with or in close proximity to an infected one, and if so, within how many yards? What is the infective radius of glanders? If I understand the Professor aright, he said that glanders bacillus, or its product, is not inhaled as a gas, and that it is only after the discharge is dry and volatilized that it enters and is diffused in the atmosphere of the stable. Then, according, I will say to his learning, it is inhaled by the sound animal. I want to know whether there is any distinction as to radius. Next, I want to know the condition of the infecting material—its condition at the time of infection. Does it pass into the horse in the form of an impalpable powder, in the form of vapour, or as the bacillus itself? Regarding the mode of infection, I daresay everyone is agreed that wounds may be infected, that infection may take place through the skin. But Professor McFadyean denies that infection can take place through the intact skin, and asserts that infection takes place through the respiratory tract, and only occasionally through the alimentary canal. The essayist will, doubtless, remember some experiments performed by Babes, to prove the possibility of infection through the intact skin, and he succeeded in proving—to his own satisfaction, at all events—that infection took place through the hair follicles.

Professor MCFADYEAN: Was that glanders?

Professor MACQUEEN: Yes.

Professor MCFADYEAN: In the horse?

Professor MACQUEEN: I think so. I have little to say with regard to the mode of infection which is called respiratory, beyond remarking that Renault for twenty years experimented as to the mode of infection in glanders long before Cadéac and Malet, and there is no doubt that Renault only succeeded six times out of many trials. But unfortunately the details of Renault's experiments are missing, so that although his experiments are often mentioned, yet there is no very satisfactory account available as to how they were carried out. I notice, however, in quite a recent discussion that Chauveau maintains, I believe on very good authority, that Renault's experiments were conducted with very great care and that they never proved to his (Renault's) own satisfaction that glanders was very often transmitted by the respiratory tract. Cadéac and Malet tried to transmit glanders by intratracheal injections and failed to produce the usual glanders lesions. They only succeeded in producing localised lesions—bronchitis and pneumonia, but no tubercles. Passing now to the digestive tract—to infection by way of the digestive tract—here Renault again was the first who conducted a long series of experiments by mixing horse foods with glanders material, sometimes succeeding and sometimes failing. Then there are the experiments of Cadéac and Malet alluded to, I believe, by Professor McFadyean in his paper. Cadéac and Malet employed various materials such as pieces of glandered tissue, nasal discharge, tubercles and pus, with which they fed their subjects, and in many cases the result was negative. They concluded that it was necessary, in order to infect through the digestive tract, to have a wound in the mucous membrane. Coming to a later period—so late as the summer of last year—we find that Nocard, who up to that time held the opinion that glanders was transmitted through the respiratory tract, had somewhat modified if not altogether changed that view. In April last he happened to have in his possession a mule which he kept for a period of four months under observation, testing and retesting it with mallein to satisfy himself that it was entirely free from the infection of glanders. He then commenced his experiments by feeding the animal with a potato culture of glanders bacilli enclosed in a sort of sandwich. After a certain time he succeeded in infecting the mule, and a *post-mortem* examination revealed lesions of glanders in the spleen, and also, I believe, in the lungs; but speaking from recollection, I am not quite certain of this. That is the first reported experiment conducted with cultivated glanders bacilli. Since then, he has experimented with two horses and an ass, using bacilli on each occasion, and every time succeeded in infecting the animals through the digestive tract. In May of last year he reported to the Central Veterinary Medical Society of Paris the result of these three last experiments. The mule was killed, the ass died twelve days, one horse died nine days, and the other horse fifteen days after receiving the glanders bacilli. In concluding his report to the Central Society, M. Nocard makes the following remarks:—"The experiments that I have made and that I am pursuing have fully convinced me of the danger of pails, mangers, and common drinking troughs." He also refers to Cadéac and Malet's experiments, and he maintains that the bacilli can enter the system without an abrasion of the mucous membrane of the digestive tract. He is supported in this by Chauveau, who states, as the result of his own experiments, that glanders infection may occur without abrasion of the mucous membrane. The discussion was closed by Leblanc, who remarked that the propagation of glanders through the digestive tract was well known, and that when he was sanitary inspector for the district of the Seine he reported that one of the principal causes of the propagation of glanders amongst cab horses was due to watering out of the same buckets on the

public roads." Apart from these experiments which, though not numerous, serve to show the possibility of infection through the digestive tract, there are those rather rougher experiments occasionally reported from Zoological Gardens where animals fed on raw horse flesh sometimes die of glanders. There are several cases on record, and I am very much inclined to urge that the digestive tract should not be lost sight of as rather a frequent pathway for the entrance of the organism or infective material of glanders. I noticed that Professor McFadyean referred to the absence of lesions in connection with the stomach intestine—the absence of lesions in the mesenteric glands—such as one would expect if the infection took place through the alimentary tract; but it is possible that the digestive fluids may have some kind of modifying influence upon the bacilli when taken with the food, and that influence may be equal to preventing local lesions. I throw out this hint which may suggest another view to some other member of this Society. If the bacilli pass from the digestive tract by the lymphatics, it is quite likely they will be arrested in their progress in the mesenteric glands, and if they are taken up by the blood stream then, of course, they ought to be arrested somewhere in the liver. But the question arises if the capillaries of the liver, if the vascular system of the liver is not on rather different principle from that of the lungs, so that the organism may pass through the liver without being arrested, whereas it cannot so easily pass through the lungs.

As to the distinction between the acute and chronic forms of glanders. I believe that this distinction was first made by Coleman. I quite agree with Professor McFadyean that acute glanders is not often seen now, but that is not the fault of glanders. It is because a great deal more attention is paid to nasal discharge—a great deal more suspicion is excited in the practitioner by nasal discharge, and "doubtful" horses are not allowed to live so long as formerly. I remember a time, not so many years ago, when acute glanders was rather common. I refer to a time when the glandered horse had a well-marked discharge from one or both nostrils and a submaxillary swelling, when the breathing was noisy or audible and horse in distress, when the temperature was 106, 107, and when the animal was killed the whole interior of the nasal chamber was found infiltrated and ulcerated, the lining of the trachea in a similar condition, and both lungs more or less affected with glanders' lesions. That was the kind of case called "acute"; it is not often seen now, but I remember the time when it was not at all uncommon.

I think Professor McFadyean is well aware of the many experiments that have been performed—some successfully—to ascertain the curability of glanders. It will not do harm to give some of the information and to recall the main facts to the Professor's memory. One observer maintains that when the bacillus of glanders is passed through cats a mallein can be obtained from the blood and organs of the inoculated cat which can be used in the cure of glanders. For instance, one observer—his name, I think, is Bonome—has proved by experiment that by giving fourteen injections in forty days of the mallein obtained from a cat inoculated with glanders, he can get rid of all symptoms of the disease in a horse. By a similar process the same observer cured glanders in dogs but failed in the case of guinea-pigs. There is one authority on glanders whose name is very frequently quoted, I mean Semmer. Last year he contributed quite a long article on the subject of glanders, particularly concerning the curability of the disease, and he refers to the work of two Algerian veterinary surgeons, Decroix and Bougome. These gentlemen are said to have cured numerous cases of farcy by the cauterisation and extirpation of farcy ulcers, a practice that was very common in this country some years ago; and, so far as the external appearance, the general behaviour and well-being of the animals afterwards were concerned, the cases were apparently cured. Semmer also alludes to experiments in regard to the

curability of glanders carried out at Turin by Brusaco and his pupils, who are said to have cured 50 per cent. of glandered horses by treating them with carbolic acid, iodine, sublimate, and ferri sulph. Levi and J. Neumann claim to have cured horses with tracheal injections of iodine, and potash iodide. In France they have adopted a mode of treatment and succeeded to their own satisfaction by giving glandered horses creosote in oil hypodermically. Semmer, alluding to his own work, in conjunction with Itzkovitsch, states that they witnessed recovery in a notorious case of inoculated glanders and farcy in a filly at Dorpat. Semmer further refers to the action of ox blood serum as being useful in the cure of glanders; and in this he is supported by another observer called Barbes, who maintains that ox blood serum has a beneficial therapeutic action in glanders. Then there is Pilarios, who cured eight glandered horses in the first stage of the disease by repeated weekly injections of mallein. There is another case of cure—in the human subject—reported in *The Veterinarian* of last year. This case, too, was treated by frequent injections of mallein. Following similar lines Helman, who name has been mentioned in connection with the discovery of mallein, has cured one case of glanders. The horse was subsequently tested with mallein and failed to react. Injections of blood serum from this horse applied to cats and guinea-pigs reduced the predisposition of these animals to glanders. I gather that Semmer prefers ox blood serum to mallein in the treatment of glanders. The serum has more effect on the bacilli, which when exposed to ox serum lose much of their virulence. To prevent misunderstanding, I ought to say that a glandered horse is said to be cured when it ceases to react to mallein. So much for the curability of glanders. Referring to the symptoms, I am glad to see that Professor McFadyean has taken the trouble to notice the symptoms of glanders, because it is high time that the text books were revised with regard to the symptomology of glanders; and I must congratulate the Professor (if it is possible for me to congratulate him), upon the symptoms which he lays down in the summary of his paper. With the diagnosis of glanders, as given in the summary, I agree, and consider that there are numbers of cases which are not diagnosable by any means short of the use of mallein. Horses that are healthy to all outward appearance, injected with mallein, are found to react, and when killed, their lungs show the characteristic lesions. With regard to mallein itself, I have a few words to say. I want to know—if I can obtain the information—how mallein acts. That it is effective, that it is potent, that it has an extraordinary action, no one who has used it can deny. It raises the temperature, it causes a swelling at the seat of injection, it makes some horses yawn, causes some of them to lose control of their limbs, to stagger, and to fall lame; it affects the appetite, and upsets the horse generally. If a small quantity of this material called mallein, has such effect upon a horse in which *post-mortem* examination discovers a few tubercles in the lungs, we cannot withhold the belief that it must be a very powerful agent.

(*To be continued.*)

BOMBAY VETERINARY COLLEGE.

PROFESSIONAL Examinations of the Bombay Veterinary College for 1895 were conducted by a Board of Examiners composed of the following gentlemen:—President, Veterinary-Captain J. W. A. Morgan, Superintendent, Civil Veterinary Department, Bombay Presidency; Members, Veterinary-Captain H. M. Maxwell, Superintendent, Civil Veterinary Department, Beluchistan, Veterinary-Captain H. T. Pease, Assistant to the Inspector-General, Civil Veterinary Department; Dr. M. G. Deshmukh, M.D., B. Sc., B.A.; Veterinary-

Lieutenant E. W. Larnder, A.V.D., Assistant Principal, Bombay Veterinary College; Mr. N. D. Dhakmarwala, G.B.V.C., Lecturer on Anatomy, Bombay Veterinary College; Mr. V. E. Vakharia, G.B.V.C., Lecturer on Chemistry, Bombay Veterinary College; Secretary Veterinary-Captain James Mills, A.V.D., Principal, Bombay Veterinary College. The Board commenced their work on 19th April, 1895, and examined 51 students. Out of fourteen students that presented themselves for the Third Professional Examination, nine passed; out of eleven, nine passed in the Second Professional Examination, and out of twenty-six, nineteen passed in the First Professional Examination. The following is the list of students who passed the different examination:—

The Third Professional (Diploma) Examination:—First Class—G. D'Silva, Hassen Aly, Subramani, and A. P. Edibam; Second Class—F. D'Silva, C. Engel, W. Buckel, V. K. Vairagkar, and I. G. Joshi.

Second Professional Examination:—First Class—H. Foy, E. T. Hoole, W. R. Mudliar, and A. I. Shaikh; Second Class—S. E. Benjamin, D. H. Chitnis, D. B. Mamtora, F. K. Desai, and C. Buckel.

First Professional Examination:—Second Class—A. J. Ansari, A. K. Duberia, R. W. Simpson, E. H. Brand, C. G. Mehta, M. C. Joshi, Abdul Rahiman, J. F. Valladares, T. K. Daru, V. G. Thakur, J. Coaroy, B. Basu, K. J. Bhatt, and D. S. Kapadia; Pass Class—K. Runganah, W. Stephens, N. K. Malandkar, S. G. Shirgaonkar, and C. B. Antia.

The following is a list of prizes that were awarded:—

(1) The Hon. Mr. Justice Bayley's prize of Rs. 50 in books and instruments for the best students at the Third Professional Examination was awarded to G. D'Silva; (2) M. R. Ry. Man Mull silver medal for the best Hindoo student at the Third Professional Examination was awarded to Subramani Mudliar; (3) Veterinary-Captain J. Mills' prize of Rs. 30 in books and instruments for the best student in Operative Surgery was awarded to G. D'Silva; (4) Government Silver Medal for the best student in soundness was awarded to F. D'Silva; (5) Veterinary-Captain J. W. A. Morgan's prize of Rs. 32 in books and instruments for the best student in Obstetrics and Breeding was awarded to Subramani Mudliar; (6) Veterinary-Captain J. Mills' prize of Rs. 25 in instruments for the best student in shoeing was awarded to G. D'Silva and Subramani Mudliar; (7) Mr. J. Mollison's prize of Rs. 25 in books and instruments for the best student in Hygiene and Sanitary Science was awarded to Subramani Mudliar; (8) Sir D. M. Petit's prize of Rs. 40 in books and instruments for the best student at the Second Professional Examination was awarded to H. Foy; (9) Sir D. M. Petit's prize of Rs. 20 in books and instruments for the best student in Anatomy and Physiology at the Second Professional Examination was awarded to H. Foy; (10) Mr. J. M. Doctor's prize of Rs. 25 in books and instruments for the best student at the First Professional Examination was awarded to A. J. Ansari; (11) "Steel" Memorial Silver Medal for the best student in the handling of animals was awarded to R. W. Simpson; (12) Mr. N. D. Dhakmarwala's prize of Rs. 20 in books and instruments for the best student in Anatomy and Physiology at the First Professional Examination was awarded to A. J. Ansari; (13) Dr. M. G. Deshmukh's prize of Rs. 15 in books and instruments for the best student in Chemistry and Botany was awarded to A. K. Duberia.

On Monday, the 29th April, the PRESIDENT, after declaring the results and distributing the prizes, delivered the following address:—"Mr. Principal, Gentlemen, and Students,—This is the third occasion on which I have had the pleasure of acting as President of this Board, and must congratulate the executive officers of the College on the great improvement that has taken place in the practical part of the examination. I need hardly say that there is yet room for further improvement, and it is in the hands of Class B men to show us next year that they can achieve greater and better results than the

students who have gone before them. Theory, of course, is absolutely necessary; but the good practical man, when he gets to a village, takes off his coat, and sets to work in a business-like way, is the class of material we want to form the backbone of the Civil Veterinary Department in India. These men appeal to the owner, he places confidence in them, and this mutual understanding once established, can and does lead to good results. I won't say anything about the impractical man, as we know by experience what he does when let loose in a district. I congratulate those of you who have got your diplomas and are about to commence life in real earnest. The life you have chosen is, I grant, a hard one. It is, however, full of interest and constant change. Difficulties will, no doubt, spring up on all sides at the commencement of your career; but the steady, systematic work will soon overcome these. As you gain experience and confidence in yourself, so will your work become both a pleasure and a profit to you. Those of you who are leaving this institution for good, I wish you all success. My earnest hope is that you will lead sober, industrious lives, become useful and respectable members of society, and be able in the future to give a good account of yourselves."

Veterinary-Captain J. MILLS, Principal of the College, thanked the President for kindly taking the trouble in distributing the prizes to the students. He also thanked the members of the Board of Examiners for conducting the examinations in the most able and just way. In his speech he gave sound advice to the new batch of graduates, and wished them success in their future career.

GLASGOW VETERINARY COLLEGE.

THE examination of the Royal College of Veterinary Surgeons took place in the Glasgow Veterinary College, Buccleuch Street, on Wednesday, Thursday, and Saturday, the 22nd, 23rd, and 25th May last. The Board of Examiners included Captain Butler, F.R.C.V.S.; Captain R. Moore, F.R.C.V.S.; Mr. H. Somerville, B.Sc. London; Professor J. R. Green, M.A., B.Sc. London; Colonel W. B. Walters, C.B., F.R.C.V.S.; Mr. John M. Munro, D.Sc.; George Fleming, C.B., LL.D., F.R.C.V.S.; Mr. J. W. F. Peacock, M.D., F.R.C.V.S.; Professor J. B. Haycroft, M.B., D.Sc.; Captain Fred Smith, F.R.C.V.S.; Mr. R. Bloyes, F.R.C.V.S.; Mr. Finlay Dun, F.R.C.V.S.; Mr. W. Duguid, F.R.C.V.S.; Mr. G. Sims Woodhead, M.D., F.R.C.P.E.; Mr. Sheridan Delepine, M.B., B.Sc.; Mr. J. B. Wolstenholme, F.R.C.V.S.; Mr. J. Freeman, F.R.C.V.S.; Mr. J. R. Cox, F.R.C.V.S.; Herbert Davies, Swansea, Glamorganshire; Mr. Harry Olver, F.R.C.V.S.; Mr. J. Clerk, F.R.C.V.S.; Mr. J. Malcolm, F.R.C.V.S.; Mr. W. Woods, F.R.C.V.S. There were also present as *ex officio* members:—Principal M'Call, F.R.C.V.S.; Professors W. Limont, M.A., M.B.; J. M'Intosh M'Call, M.B., C.M., M.R.C.V.S.; Thomas King, T. S. Goodwin, F.C.S.; J. Murphy, C. J. Dunn, M.R.C.V.S.; and R. Dobbie, secretary.

The following students passed the A, or first professional examination, viz:—J. Keir, Springburn; R. Spittal, Pollokshields; F. Timeny, Partick (2d. honours); A. K. Murray, Milliken Park; T. Kilpatrick, Belfast; J. M'Leod, Gatton, Queensland; D. Weir, Milngavie; J. Stevenson, Dumbarton; R. G. Jones, Newmarket, Wales (2d. honours); H. Oliver, Birmingham (1st honours); C. W. M'Kay, Greenock (2d. honours); W. W. Lang, Alexandria; J. T. Shannon, Lexington, Kentucky; J. H. Steeds, Dundalk.

The following passed the B, or second professional examination, viz:—H. Ferrier, Bathgate; T. G. Palgrave, London; J. A. Todd, Brighton; F. Russell, Ballynahinsh; J. B. Gates, Glasgow; A. Wooley, Shisken, Arran; G. Broom, Glasgow (2d. honours): R. G. Anderson, Glasgow; J. A. Marshall,

Torrance of Campsie; J. F. M'Eachran, Campbeltown; T. Rennie, Ayr; J. Donaldson, Large; J. R. M'Call, Blairtummock, Baillieston.

The following students passed the first (or theoretical) part of the first examination:—A. Spruell, jun., Paisley; W. M'Murray, Dromore; R. Armstrong, Belfast; W. M'Connell, Londonderry; W. Roy, Glasgow; A. Main, Liverpool; J. Dick, Port-Glenore, County Antrim; R. Griffin, Skerries, County Dublin; A. P. Stewart, Glasgow; R. K. Rutherford, Warwick; L. H. M'Queen, Cardonald, Renfrewshire.

The following gentlemen passed the seeond or practical part of the final examination, and received the diplomas of the Royal College of Veterinary Surgeons:—A. Spruell, jun., Paisley; W. M'Murray, Dromore, County Down; R. Armstrong, Belfast; W. M'Connell, Londonderry; W. Roy, Glasgow; A. Main, Liverpool; J. Dick, Port Glenore, County Antrim; R. Griffin, Skerries, County Dublin; A. P. Stewart, Glasgow; R. K. Rutherford, Warwick.

Medals granted by the Highland and Agricultural Society of Scotland, the late Professor Allen Thomson, of London, and Principal M'Call; and certificates of merit were awarded in the different branches of study as follows:—

Medicine and surgery (horse), written examination—Silver medal, R. Armstrong; first-class certificates, R. Rutherford, A. P. Stewart; second-class certificates, R. Griffin, W. Roy, and A. Spruell.

Medicine and surgery (cattle) written examination—Silver medal, R. Rutherford; first-class certificates, R. Armstrong, M. E. White; second-class certificates, J. Brown, R. Miller, A. Spruell.

Materia medica, written examination—Silver medal, W. Roy; first-class certificates, R. Armstrong, J. Dick, R. Rutherford; second-class certificates, W. M'Murray, R. Griffin.

Pathology—Silver medal, J. Dick; first-class certificates, A. P. Stewart, A. Main; second-class certificates. R. Armstrong, W. Roy, and R. Griffin.

Senior anatomy—Silver medal, R. G. Anderson; first-class certificates, J. M'Eachran, J. Donaldson, and J. Smith; second-class certificates, J. Marshall, F. Palgrave, and D. Walker.

Physiology—Silver medal, R. G. Anderson; first-class certificates, J. Marshall, J. Donaldson, and J. Smyth; second-class certificates, J. Smith and J. Crawford.

Junior anatomy—Silver medal, C. W. M'Kay; first-class certificates, W. Lang, A. K. Murray, J. Shannon, and H. Oliver; second-class certificates, H. Gardner, E. Soutar, and J. M'Leod.

Chemistry—Silver medal, C. W. M'Kay; first-class certificates, C. W. M'Kay, R. G. Jones, and John Stevenson; second-class certificates, John Baird, Troy Kilpatrick, and A. Spittal.

Botany—Silver medal, C. W. M'Kay; first-class certificates, J. M'Leod, H. Oliver, and John Stevenson; second-class certificates, W. W. Lang, R. G. Jones, Frank Timeny, and David S. Weir.

Zoology—Silver medal, C. W. M'Kay; first-class certificates, John Stevenson, R. G. Jones, H. Oliver, and J. Steede; second-class certificates, D. S. Weir, J. Small, and W. Lang.

Practical examination of horses as to age, soundness, operations, &c.—Gold medal (by Principal M'Call), W. M'Murray.

Practical examination of cattle and sheep as to age, soundness, operations, &c.—Gold medal, R. Griffin.

DICK VETERINARY COLLEGE.

Class C.—Messrs. T. Bouchier-Hayes, H. H. Carlisle, D. Cumming, A. G. Elder, H. Featherstonhaugh, W. H. Harvey, P. J. Howard, W. Ison, S. S. Johnstone, A. Marstone, J. J. Neeson, E. C. Norgate, W. H. Pickering,

F. G. Relf, J. D. Richardson, K. Roberts, A. R. Routledge, E. C. Russell, J. Scott, W. D. Wallis, W. S. Worthington.

CLASS B.—†Messrs. J. Brownless, W. Cathcart, F. Fail, S. S. Foster, R. W. Hadfield, W. W. Hirst, N. Howe, †J. R. Jackson, †H. Lomas, F. McGee, †T. Morland, W. Murgatroyd, *W. Stableforth, J. C. Stevens, J. F. Talbot, H. Tasker, H. O. Thomson, *W. J. Watt, W. Young, J. Younghusband.

CLASS A.—Messrs. G. W. Bloxome, E. Brown, T. H. Brown, A. C. Burton, D. R. Chalmers, E. Evans, G. Galt, R. Garraway, R. Garrett, †A. Gibson, C. P. Hynes, J. Maguire, P. Mahar, C. F. Parsons, H. Percy, J. W. Pollock, C. A. Reid, N. Roberts, H. Ryan, J. Seton, W. Tart, S. A. Winkup.

Obituary.

Peter Taylor, Manchester, Graduated Member, April, 1844. Fellow, February, 1877.

Edward Marshal Jones, Tetbury, Gloucestershire, graduated April, 1868.

Charles Phillips, Veterinary Lieut.-Colonel, A.V.D., graduated April, 1870.

CONTROLLING TUBERCULOSIS.

BY JOHN SPEIR, NEWTON FARM, NEWTON.

As neither farmers nor the public have as yet realised how infectious tuberculosis seems to be, nor how easily it may be reduced to very small proportions, it may interest many to know what already has been done on an average farm, and under average conditions, in Denmark. The idea of slaughter and compensation has taken such a hold on some of our legislators, and not a few farmers, that they look upon the scheme, submitted by me lately to the Royal Commission on Agriculture, as puerile, while not a few consider that by far too much talk is being made of the losses through tuberculosis, and the risks to human life from it. The report of the Royal Commission on Tuberculosis has settled the latter point. I will now give a few particulars bearing on the former :—

In the spring of 1892, the stock of the farm of Thürebylille, near Copenhagen, consisting of 208 animals, were all subjected to the tuberculin test. As a rule, the most of the cows had been bred on the farm, all the heifer calves being usually kept. I have not the details of the numbers of each ; all I know is that from 130 to 135 cows and bulls were kept, the remainder being young animals. The tuberculin test indicated that 80 per cent. of the cows, and 40 per cent. of the heifers and calves, were infected with the disease. In Denmark, the byre, as a rule, is a very large building, with a hay-loft over ; and as no convenience existed on the farm for housing the healthy stock in a separate byre, it was decided to make a division across the existing one with boards and tar-cloth, and allow as little communication as possible between the two lots. At this date, May, 1892, the total number of healthy animals was seventy, fully one-third of which were cows, the remainder being calves and heifers.

In November, 1892, the healthy part of the stock was again subjected to the tuberculin test, when seven animals out of the seventy which were correct in May, were rejected.

In May, 1893, the number of previously healthy animals on the farm, including calves, was 103, out of which ten failed to stand the test.

In November, 1893, the previously healthy animals had increased by births to 107, from which only one was rejected at this date.

Marked thus * passed with Second Class Honours.
Marked thus † passed with First Class Honours.

In May, 1894, the healthy stock had increased to 122, and of these only two failed to stand the test.

In May, 1895, the healthy portion of the stock consisted of six bulls, sixty-five cows, twenty-eight heifers, thirty-seven calves—a total of 136 animals, every one of which passed safely through the tuberculin test. Two cows and two calves showed slight suspicious symptoms, and two of these are to be killed shortly, in order to see if any traces of the disease remain.

At this date the total stock comprises—

6 bulls healthy.
2 „ unhealthy.
65 cows healthy.
67 „ unhealthy.
28 heifers healthy.
37 calves healthy.

Total, 205 animals, of which 136 animals are sound and 69 unsound.

In three years, therefore, here is an ordinary breeding stock which, without any unusual slaughter or selling of animals, or indeed any special precautions other than the use of the tuberculin test, the separation of the healthy from the unhealthy animals, has had its number of healthy animals raised from 70 to 136, all of which may be now guaranteed as sound, while the infected animals through age will be mostly disposed of within the next year or two. If this stock proceeds during the next two years as we have reason to believe it will, the original infected animals will be all disposed of, and a most unhealthy stock will have been transposed into one free from tuberculosis, all in the short space of five years, and that without specially sacrificing a single animal. With the exception of the separation of the infected and healthy animals, and the boiling of the milk given to the calves, this stock has been purposely kept as it previously was, *the calves being bred and fed from healthy and unhealthy cows and bulls alike.* These results distinctly seem to prove that all that is necessary to fairly control bovine tuberculosis is first, *to rigidly separate the healthy from the unhealthy stock;* second, *to feed the calves on the milk of the healthy cows only;* and third, that unhealthy or reacting cows or bulls should as seldom as possible be bred from. These precautions being observed, it seems quite easily possible to rear a thoroughly healthy stock without resorting to such extreme measures as slaughtering and giving compensation for all infected animals, and thereby upsetting the whole cattle trade of the country.

The history of the calves bred on this farm is a very interesting one, and regarding which I have information up to the present month. As previously said, the calves have been bred from healthy and reacting cows and bulls alike; but, as a rule, all the males and such of the females as were thought not good enough to keep, were killed a day or two after birth. All those which were kept for stock purposes were subjected to the tuberculin test when from six to eight weeks old, *and in only one case has a calf failed under it,* while in the calves killed soon after birth, not a single case of congenital tuberculosis was found.

Post-mortems.

Doubt has occasionally been thrown on the reliability of the tuberculin test for diagnosing this disease, but the *post-mortems* of the animals killed on this farm since 1892, and elsewhere, distinctly show that the indications given were most correct. The carcases of the animals at Thürebylille were all dressed and sold for human food, so that they could not be roughly cut up in the search for evidence of the disease in the flesh or glands, the experimenters in most cases contenting themselves with a thorough examination of the internal organs and a few of the glands.

During 1892 and 1893 there were slaughtered 107 animals, of which 80 were found to be tuberculous, or about exactly the percentage indicated by the test in May, 1892. Out of the 80 tuberculous animals, five had not reacted under the test when last made, showing either that they had contracted the disease since last tested, or, as was supposed in these cases, that the animals had been slightly infected at some previous date, but had been able to throw it off. In these cases the disease was of a very slight degree, and seemed dead, and of an old date.

The remaining 27 animals were all found healthy, as far as the examination went, and with the exception of two, the tuberculin test had indicated that they were free from disease. These two had, however, shown the typical reaction, but no disease could be found in them, although it might exist in some of the glands or elsewhere, which were not available for inspection. Since last summer, five animals have been slaughtered from the reacting portion of the herd, two of which showed developed tuberculosis.

Since 1893, there have been 18 animals slaughtered after fattening from the sound portion of the herd, none of which, when last tested, showed any symptoms of disease, and, with the exception of three, they were all found sound. These three formed part of the original herd before division, and had, of course, been in bad company, and they showed some slight traces of old tuberculosis in a few glands, *but none apparently fresh.*

What the Danish farmers think of it.

During the past three years, the Danish Government have offered to test, free of expense, all young stock belonging to owners who guaranteed that it would be kept rigidly separate from older or reacting animals. Under these conditions 650 farms, carrying 16,676 animals, had the whole stock tested between May, 1892 and 31st December, 1894. The Danish farmers, are, however, so pleased with the results already obtained, that up to date there are applications from other 2,500 farms, which speaks volumes for the success of the test.—*North British Agriculturist.*

CONTAGIOUS DISEASES ANIMALS ACTS, 1894.

Abstract from the Summary of Returns for the week ending May 18th, 1895.

ENGLAND AND WALES.

Pleuro-Pneumonia.	Swine Fever.	Anthrax.	Glanders (including Farcy).	Rabies.	Foot-and-Mouth Disease.
None	*Slaughtered* Diseased, etc. ... 879 Died ... 160 Suspected 41 1080	Fresh Outbreaks 6 Animals Attacked 22	Fresh Outbreaks 17 Animals Attacked 23	Dogs Killed 16	None

* Wales, 6 cases Swine Fever.

SCOTLAND, week ending May 18th, 1895.

None	*Slaughtered* Diseased, etc. ... 61 Died ... 10 Suspected — 71	Fresh Outbreaks 2 Animals Attacked 2	Fresh Outbreaks 1 Animals Attacked 2	None	None

IRELAND, week ending May 18th, 1895.

Pleuro-Pneumonia.	Swine Fever.	Anthrax.	Glanders (including Farcy).	Rabies.	Foot-and Mouth Disease.
None	*Slaughtered* Diseased, etc. ... 111 Died ... 54 Suspected 18 183	None	None.	Dogs Killed 16 Cattle ,, 4 Sheep ,, 1 Goats ,, 1	None

ENGLAND AND WALES, week ending May 25th, 1895.

None	*Slaughtered* Diseased, etc. ...1033 Died ... 202 Suspected 74 1309	Fresh Outbreaks 4 Animals Attacked 6	Fresh Outbreaks 19 Animals Attacked 31	Dogs Killed 14 ,, Died 1 15	None

* Wales, 45 cases Swine Fever.

SCOTLAND, week ending May 25th, 1895.

None	*Slaughtered* Diseased, etc. ... 13 Suspected 2 15	Fresh Outbreaks 4 Animals Attacked 4	Fresh Outbreaks 1 Animals Attacked 1	None	None

IRELAND, week ending May 25th, 1895.

None	*Slaughtered* Diseased, etc. ... 102 Died ... 51 Suspected 7 160	None	None	Dogs Killed 15 Cattle ,, 1 Ass ,, 1 Dog Died 1 Ass ,, 1 19	None

ENGLAND AND WALES, week ending June 1st, 1895.

None	*Slaughtered* Diseased, etc. ...1116 Died ... 194 Suspected 58 1368	Fresh Outbreaks 9 Animals Attacked 15	Fresh Outbreaks 16 Animals Attacked 21	Dogs Killed 15 ,, Died 2 17	None

* Wales 37 cases Swine Fever.

SCOTLAND, week ending June 1st, 1895.

None	*Slaughtered* Diseased, etc. ... 42 Died ... 2 Suspected 1 45	Fresh Outbreaks 1 Animals Attacked 1	None	None	None

IRELAND, week ending June 1st, 1895.

Pleuro-Pneumonia.	Swine Fever.	Anthrax.	Glanders (including Farcy).	Rabies.	Foot and-Mouth Disease.
None	*Slaughtered* Diseased, etc. ... 90 Died ... 40 Suspected 23 153	None	None	Dogs Killed 23 Cattle ,, 1 Sheep ,, 1 Goat ,, 1 Suspected 4 30	None

ENGLAND AND WALES, week ending June 8th, 1895.

None	*Slaughtered* Diseased, etc. 1511 Died ... 298 Suspected 51 1860	Fresh Outbreaks 5 Animals Attacked 5	Fresh Outbreaks 21 Animals Attacked 25	Dogs Killed 10 ,, Died 2 12	None

* Wales, of Swine Fever, 14 died, 26 slaughtered.

SCOTLAND, week ending June 8th, 1895.

None	*Slaughtered* Diseased, etc. ... 18 Died ... 3 Suspected 1 22	Fresh Outbreaks 2 Animals Attacked 1	None	None	None

IRELAND, week ending June 8th, 1895.

None.	*Slaughtered* Diseased, etc. ... 73 Died ... 63 Suspected 51 187	None	None	Dogs Killed 15 Cattle ,, 3 18	None

ENGLAND AND WALES, week ending June 15th, 1895.

None.	*Slaughtered.* Diseased, etc. ...1618 Died 374 Suspected 43 2035	Fresh Outbreaks 3 Animals Attacked 4	Fresh Outbreaks 17 Animals Attacked 27 Killed ... 33	Dogs Killed 15	None.

* Wales, Swine Fever, 33 killed, 8 died.

SCOTLAND, week ending June 15th, 1895.

None.	*Slaughtered* Diseased, etc. ... 77 Died ... 1 Suspected 0 78	Fresh Outbreaks 1 Animals Attacked 2	None.	Dogs Killed 1	None.

IRELAND, week ending June 15th, 1895.

Pleuro-Pneumonia.	Swine Fever.	Anthrax.	Glanders (including Farcy).	Rabies.	Foot-and-Mouth Disease.
None	*Slaughtered* Diseased 82 Died ... 55 Suspected 42 179	None	Killed ... 2	Dogs Killed 17 Cattle ,, 1 Sheep ,, 2 Ass ,, 1 Sheep died 2 *Slaughtered* Pig ... 1 Ass ... 1 25	None

Veterinary Department, Privy Council, Dublin Castle.

I regret to notice that the measures adopted by the "Animals" Department of our Board of Agriculture to suppress swine fever are proving ineffectual, also that the dread malady rabies in dogs is not receiving the attention from that Department at the present time so urgently required. As regards swine fever, so little impression is being made upon its progress by the Government staff appointed solely for the purpose of ridding the country from contagious diseases among the lower animals, that opinions of not too flattering a character are being freely expressed among all interested upon a Department that has been reconstructed with such unfortunate results.

Last year, in England, Scotland and Wales, from 1st January to 1st June, 3,415 swine died from fever; for a corresponding period this year 3,683 died. The slaughter of swine diseased and of those exposed to infection has so far this year not been so great as was the case last year, the figures being in 1894, to 1st June, 29,336; in 1895, to 1st June, 18,763, the deaths, on the other hand, being larger in number. The fierce light that has beat upon this Department of late has disclosed a state of matters within it that goes far to account for its want of success, and that renders any further comment superfluous and unnecessary. The Irish Executive has done better work, the Returns in Ireland for corresponding periods being to June 1st, 1894, 12,194 swine slaughtered, and 1,170 died; to June 1st, 1895, 3,411 slaughtered, 838 died. These statistics indicate the likelihood that the disease will shortly be categoried in Ireland with Pleuro-pneumonia and Foot and Mouth Disease, as being non-existent there.

As regards rabies we have every reason to be anxious. There is a serious increase of the disease, both in England and Ireland, Scotland and Wales being at this date free from it. In England, during the past five months, 373 dogs have been "killed or died," while last year, for the same period, there were 80. Ireland returns for the same period this year 328 animals "killed or died," comprising a few cattle, sheep, and swine in addition to dogs, whereas last year there were 200.

I hope shortly to learn that effective measures to extirpate these diseases will be introduced by those gentlemen who are entrusted with administrative powers on the Board of Agriculture. It is evident they are required. I would further suggest that, if at all practicable, no dogs should be permitted to enter this country from the Green Isle until the cessation, or a very marked decrease, of rabies is reported from Dublin Castle.

The suppression of tuberculosis in cattle by scientific methods continues to engage the earnest attention of European Continental Powers and the United

States of America, and if there is any virtue in the aphorism that example is better than precept this country may yet reap some benefit should a spirit of emulation be aroused in those we have to look to for the promotion of our national and individual prosperity in relation to the conservation of our flocks and herds.

I beg to refer the readers of the Journal to the Extract from the Consular Report from the State of Massachusetts, in the pages of this issue, on Tuberculosis. The British Consul therein reports: "The experiment is undertaken without stint in regard to expense, with a judicious mingling of energy on the part of those charged with carrying out the regulations, and regard for the interests of those affected by the provisions of the law." The system of inspection, inoculation, etc., is, moreover, admirable, and it would give great opportunities to our lay inspectors to redeem any reputation they may have had for usefulnes, forfeited by their inability to root out swine fever.

STARTLING STATEMENTS ABOUT MICROBES.

PROFESSOR RAY LANKESTER concluded on Tuesday a series of four lectures at the Royal Institution on "Thirty Years' Progress in Biological Science." He took up the subject of bacteria as the cause of putrefaction and disease. He said that much had lately been said about certain bacteria as the cause of certain diseases. That this was so had been definitely ascertained in certain cases, but many diseases were not properly proved to be caused by bacteria. How do we know that bacteria produced disease? By isolating some of the suspected microbes obtained from man and animals during the cause of the disease, cultivating them separately to get the breeds pure, and then injecting them into healthy bodies. If the disease is thereby produced it is pretty obvious that the microbe is responsible. Now in many instances the process has failed, notably in the case of influenza; but with anthrax, recurrent fever, phthisis, leprosy, glanders, cholera, typhoid, lockjaw, and diphtheria, Professor Ray Lankester holds that the proofs are incontestable. Perhaps the most extraordinary case is lockjaw or tetanus. The bacteria which cause this are found in agricultural soil, a fact which explains the well-known fact that wounds ending in lockjaw have generally been given by agricultural or gardening implements. The microbe enters with the dirt or soil into the wound, and there starts the peculiar form of blood-poisoning which ends in tetanus. It is even believed that the peculiar arrow-poison of the South Sea Islanders consists of tetanus microbes. The natives dip their arrow-heads in the mud which lines the holes of the land crabs, and the microbes from these sources are found to produce all the well-known symptoms of tetanus-poisoning.

The Danger of Drinking Pure Water.

With regard to the cholera and typhoid bacteria in drinking waters, Professor Ray Lankester made some astonishing statements as to recent discovery. Both these microbes, it is believed, can live and flourish for a time in pure distilled water; but if you turn them loose in ordinary drinking water they are promptly attacked by the ordinary harmless bacteria that abound there and are speedily killed—poisoned within a few hours, it is believed, by the toxin given off by the "harmless ones." You can even boil the ordinary water and filter out the common microbes, and yet the typhoid breeds will succumb if afterwards placed in it. Consequently, said the Professor, river water, such as our good old Father Thames supplies, is actually safer to drink, though teeming with microbes, than pure spring or lake water, in which of course, the typhoid germ can flourish unmolested!

Filters and Filters.

The great filter beds by which the large water-companies filtered their water did not act merely as mechanical filters, as was supposed, by reason of the minute spaces between the particles of sand. At such places as the beds at Hampton, the bacteria are allowed to go through the first layers of sand, and on the lower layers become a jelly, which, spreading in the sand, caused the efficiency of the filter to be immensely increased. The water had not only to go through the sand, but through the jelly, and thus could carry no solid particles with it. Not only that, but the poisonous germs of typhoid were very rapidly killed, so that the filter bed of a properly-conducted water company was not merely a filter, but a destroyer of bacteria. It was not so with the domestic filter. In nearly every one he had examined it was a means, not of stopping, but of communicating them to water.

Legal News.

FARMER FAILING TO REPORT ANTHRAX.—In the Haddington Justice of Peace Court recently, before Messrs. W. Ford, A. H. Laidlay, A. M. Main, W. Stephenson, and W. H. Gibson, Robert Auld, farmer, Lochhill, was charged with having in February, 1895, in his possession, or under his charge, a diseased or suspected animal, and did not give notice of the animal being so diseased or suspected to a constable, contrary to the Anthrax Order of 1892, and further, on 30th April, he having had in his possession an ox affected, or suspected to be affected, with anthrax, failed to give information to the police with all practicable speed. Mr. R. Maxwell Main, Procurator-Fiscal, prosecuted, and Mr. Wood, solicitor, appeared for the defender.—At the outset Mr. Wood contended that the complaint should be set aside, because his client was charged with offences in one part and contraventions in another.—Mr. Main briefly replied, and the objections were repelled. A plea of not guilty was then tendered.—*Deputy-Chief-Constable Mann* said he went to Lochhill on 16th May, along with Mr. G. Young, veterinary surgeon. He saw Mr. Auld and told him that he had heard of a man having suffered from touching an animal suffering from anthrax. Mr. Auld said the animal had apparently struck against a feeding-box about three weeks before. The body was partly boiled. Some of it was given to poultry, and his own family took part of it. He declined to answer any more questions, saying witness was trying to trap him. His son John gave a similar story, except that he himself had boiled the carcase. His father told him not to answer any more questions. On Friday, 17th May, witness went and told him that if any more animals died he had better report to the police. Dr. Howden, and Mr. Reid, sanitary inspector, were present and heard what Auld said. After a considerable amount of evasion he admitted to Dr. Howden that about ten weeks before an animal had been gored, and was killed. He denied having anthrax about his place.—Cross-examined by Mr. Wood: Auld was bound to report any case of suspected disease.—*Archibald M Leod,* cattleman, Southfield, Longniddry, and formerly in the employment of Mr. Auld, found an animal dead in a close in the month of February. About eleven o'clock in the day the animal was all right, but between three and four it was dead. He reported the matter to John Auld, who went to meet his father by the train about five o'clock. When Mr. Auld, sen., came home he said witness should have gone for Doughty and got it skinned at once. They proceeded to skin it, and the carcase was boiled up. Mr. Auld gave no reason for this. Grease was taken from it. The animal had never been gored by another, or had its leg broken. On 30th April, cattle were drawn to be trucked at Longniddry. That

day, at half-past seven in the morning, he saw an animal all right, and afterwards he found it lying dead. John Auld told him to cut its throat. The animal was warm. It was skinned, dressed, and hung up. John Auld assisted. Mr. Auld, sen., went to Edinburgh that day. On 1st May two men, one named M'Millan, from Leith came and took the carcase and skin away. About five days afterwards he felt his arm very sore and went to Dr. Howden. He took out the inside of the first beast that had died. He saw the spleen and knew about it. It was larger than in an ordinary animal, soft, and dark. The intestines were dark, and the small ones full of dirty blood. Between the hide and the carcase there was a dirty bloody fluid. The bullock died suddenly without showing any previous symptoms. In the case of the second bullock, after the hide was off he observed a mark like a bruise opposite the kidney. The blood was stickier than usual, but the flesh looked not so bad. The entrails were dark, but that would be accounted for to a certain extent, but not entirely, by the feeding on potatoes. The spleen was soft. The beast was lying on its back, and a blob of fluid was on the top of the kidney. He cut that blob to make the carcase look better. It was natural, in the operation of skinning, that his elbow could come against this. He had not skinned or come into contact with the carcases of any other bullocks.—Cross-examined by Mr. Wood: When the first bullock died he never heard anybody say it was owing to inflammation. He never heard it proposed to send the carcase to Walker, Tranent, to be boiled down. He did not know anything about what was done with the carcase after it was boiled. He never heard Mr. Auld say anything about this being a case of anthrax. Dr. Howden told him that the injury to his arm was due to blood-poisoning, but he did not say that there might not be blood-poisoning by other things than anthrax.—*David Doughty* (who had his right arm in a sling), said he was farm grieve at Lochhill, and deponed to skinning the bullock along with previous witness. He never saw intestines worse inflamed. The carcase was boiled for cart-grease, and the remainder spread on a stubble-field. He assisted to skin and dress the second bullock, and took out the inside which was decidedly better than in the case of the first animal, though it was certainly not what he would like to see. The cattleman told him that he had seen the animal dying and had stuck a knife into it. In the beginning of the next week he felt his arm sore, and a week afterwards consulted Dr. Ronaldson. The first question the doctor put was "Have you been working among skins?" and he was sent to the Infirmary where the same question was put, and a painful operation performed. On the carcase of the second bullock he noticed two dark marks opposite the kidneys. These marks could not be scraped off. In other particulars he corroborated previous witness as to the appearance of the carcase, but he did not notice the spleen.—Cross-examined by Mr. Wood: He had never said that he intended to throw himself and his family on Mr. Auld, and he had not yet raised any action for damages against Mr. Auld. All witness could say of his own perfect knowledge was that Mr. Auld saw the carcase the morning after it died. He could not say he had seen it before. Witness had no experience of anthrax before. He was sowing nitrate of soda in the month of April.—Re-examined by Mr. Main: He thought it was the cattleman who told him that the animal was not quite dead, and he had stuck a knife into its throat. It might, however, be John Auld. At all events, it was between them.—M'Leod was then recalled, and said he had never said so to Doughty. He told John Auld that the animal had died, and Auld told him to cut its throat. The animal was certainly dead at the time.—*Peter M'Cormick*, farm labourer, Lochhill, remembered assisting M'Leod to boil the carcase of a bullock in February, and also remembered about the bullock that died on 30th April.—*Jonathan Spark*, station master, Longniddry, produced

the books, showing that thirteen cattle were sent to Edinburgh by Mr. Auld on 13th April. There was no other date on which that number had been sent.—*David Niven*, butcher, Leith Street, Edinburgh, was at Swan's Auction Mart about three o'clock on 30th April. Mr. Auld told him that one of his cattle had got hurt, and he had left word to have the carcase dressed. He asked what was the best thing to do. Witness told him to send it to the dead meat market. Auld said he was busy, and witness sent M'Millan, butcher's contractor, for it. The bullock was sold for £14 5s. 6d. at the dead meat market. No commission was charged. It was simply sent as a favour to Mr. Auld. The price obtained was reasonable for a bullock of the size and weight. He had cut up the bullock himself and saw nothing wrong with the flesh.—Cross-examined by Mr. Wood: If he had thought there was anything wrong with the meat he would not have risked cutting it up. Inspectors go regularly through the market, and would discover anything wrong.—Re-examined by Mr. Main: He knew nothing about dressing beef so as to make it look better. Of course, some tradesmen killed cleaner than others.—*Wm. R. M'Millan*, butcher's contractor, Leith, deponed to having taken a carcase from Lochhill to Mr. Niven's place, and next day taking the same carcase to market. He knew it was the same carcase, and he saw Mr. Niven cut it up.—John Laidlaw, machineman, accompanied last witness in taking the carcase from Lochhill, and asked if the police could not stop them.—*Constable Donald Munroe*, Aberlady, said he had never got any notice from Mr. Auld about disease in his cattle.—*Professor Owen Williams*, New Veterinary College, Edinburgh, said he had heard the evidence of M'Leod and Doughty, and was of opinion that the disease from which the animals died was almost certainly anthrax. Animals died very suddenly from this disease. When they died putrefaction set in and destroyed the anthrax germs. He would rather handle a body which had been dead for some time than one newly dead. The germs might take some time to develope in the human skin before reaching the blood. He should not like to risk coming in contact with anthrax blood even supposing he had no scratch, but almost every man had scratches which were not visible. A man shaved might not show any scratches on his cheek, but it would not be safe to rub anthrax blood along it. There was a class of men who went in for skilful dressing by which the flesh of an animal that had died of anthrax would appear all right, except when microscopically examined. The system of inspection in Edinburgh market was not thorough. Cross-examined by Mr. Wood: He could not say when the anthrax germ came in. It was probably as old as Adam. Asked if he could explain how none except M'Leod and Doughty suffered from the anthrax, witness said there had been an outbreak of smallpox in Edinburgh recently, and he had not taken it. *George Young*, V.S., Haddington, accompanied Deputy Chief-Constable Mann to Lochhill on 16th May. Mr. Auld said one of his cattle had come in contact with a feeding box about three weeks before, and it had to be killed. That, he said, was the only death he had. He corroborated Mr. Mann's evidence and said the symptoms deponed to by previous witnesses pointed to anthrax. Cross-examined by Mr. Wood: Anthrax was pretty well known now, and if an animal died suddenly without any apparent reason the owner should be very suspicious. Dr. Robert Howden, Haddington, said M'Leod came to him with a bad arm. He made a diagnosis, and found that it was a case of anthrax. Witness asked him what he had been about that he had got this, when the man said he had been killing a bullock four or five days before. Witness did not know any other way in which this disease could be got except by contact, and possibly by inhalation. About 17th May he went to Lochhill, accompanied by Superintendent Mann and other officials. He interrogated Mr. Auld, asking what had been done with the carcase of a bullock that had died on his premises a fortnight before. Mr. Wood objected to this part of the evidence, which, he

held, was composed of statements made weeks after the alleged offence had taken place.—Mr. Main held that the evidence was quite competent.—Witness said he had got the information in Superintendent Mann's presence, but he (witness) did all the questioning.—Mr. Wood's objection was overruled.—*Dr. R. Howden* then made a statement in his own words, and without questions being put. He said he questioned Mr. Auld, giving him to understand that he had come there in the interests of public health to find what had been done with the carcase of a bullock that had died. Mr. Auld stared incredulously and attempted to deny all knowledge of any animal having died there, and attempted to confuse witness. He then admitted one having died ten weeks previously, and to its carcase having been boiled down. With regard to the other he said his son knew better.—*Dr. Wallace James*, Haddington, saw M'Leod on 24th May. From the appearance of the wound and the symptoms as stated, he believed he was suffering from anthrax. He had experience of anthrax in animals, and the symptoms stated by previous witnesses denoted its appearance.—Cross-examined by Mr. Wood: A person must have a wound before being struck with anthrax. *Dr. Ronaldson*, Haddington, said Doughty came to consult him on 13th May. He was suffering from anthrax, and his life was in imminent danger. Inspectors in the Edinburgh market could not, without microscopic examination, be sure in all cases of the existence of anthrax. It was quite possible that some people might escape anthrax and others be affected, on the same principle as some had escape the prevailing malady of influenza.—*Dr. Bond*, resident surgeon, Edinburgh Royal Infirmary, deposed to Doughty coming to the Infirmary suffering from anthrax. He was in great danger and might have died had an operation not been performed. The flesh of animals which had died from anthrax was dangerous if put into the public market.—This concluded the case for the pursuer.—For the defence John Auld, son of the accused, said he thought the first animal died from inflammation, and as it could not be bled the carcase was boiled down. On 30th April the cattleman told him about an animal having died, and witness told him to cut its throat. That was done, and he assisted in skinning and dressing the carcase. He saw nothing wrong with the flesh. The cause of death he attributed to its having received a blow, as he observed a mark near the heart. He had no suspicion whatever of anything like anthrax.—Cross-examined by Mr. Main: He did not know whether both animals had died suddenly, but they were dead when got.—*Robert Smith*, manager, Central Meat Market, Edinburgh, did not remember seeing a carcase sent by Mr. Niven to him on 2nd May, but he knew he sold one for him on that date at full market value, and it passed through the inspectors in the usual way.—Cross-examined by Mr. Main: He had seen meat condemned as affected by anthrax, and he did not think it was possible to hide it.—*Robert Auld*, the accused, said he was over 77 years of age, and had been farming all his days. When the first bullock died he told M'Leod that he usually sent these to Walker, Tranent, but he agreed to allow the carcase to be cut up and the grease taken out of it. He never saw a case of anthrax and had no suspicion. On 30th April when he was going in to Edinburgh to see some cattle sold he was told that one of the cattle was either dead or dying. He told them to cut its throat, and when he came home at night he saw the carcase hung up and the flesh looking all right. He sent it in to Edinburgh and got full value for it. When Mr. Mann came along he spoke of the first one that died, and never thought of the second one at all. When he saw Dr. Howden he never dreamed of the second one at all.—Cross-examined by Mr. Main: He told Mr. Niven in Edinburgh that he had a bullock that would be killed before he went home. He did not think, he said, it had choked on a potato. When the Inspector and Mr. Young came down he did not think it necessary to say anything about the last one that died.

When the doctor and the others were putting question after question over and over again he thought there was no use for it, and did not answer. When the bullocks died he did not think it necessary to call in a veterinary surgeon to say of what they had died. Perhaps they could not tell.—Mr. Main having pressed for the full penalty of £20 in both cases, and Mr. Wood having replied, their honours retired for twenty-five minutes.—The finding of the Court was £5, or seven days on the first count, and £20, or fourteen days on the second.

Army Veterinary Department.

Queen's Birthday.

Colonel J. D. Lambert, C.B., Director-General, Army Veterinary Department, was one of the guests at the dinner given by the Secretary of State for War in honour of Her Majesty's Birthday anniversary.

Extracts from London Gazette.

Extracts from *London Gazette* of 28th May, 1895, and 11th June, 1895:—

Veterinary-Lieutenant R. J. D. Tibalor resigns his commission. Dated 29th May, 1895.

W. B. Edwards, gent., to be veterinary-lieutenant, *vice* R. J. D. Tibalor, resigned. Dated 12th June, 1895.

The following appears in the despatches of the Waziristan Expedition, published in the *London Gazette* of the 14th instant:—"Veterinary-Major G. J. R. Rayment, Army Veterinary Department, is an officer devoted to his profession, who has done admirable work in the treatment of sick and wounded animals, and also by his sound advice in all matters connected with his department."

Death.

We regret to announce the death of Veterinary-Lieutenant-Colonel C. Phillips, which occurred in Dublin on the 14th instant. This officer was born on 26th January, 1851, received the diploma of the Royal College of Veterinary Surgeons on 19th April, 1870, and the degree of Fellowship, by examination, on 26th May, 1890. He joined the Army on 27th August, 1870, proceeded to India in December of that year, and remained in that country till January, 1878. On 4th June, 1879, he went to South Africa in veterinary charge of remounts, and served in the Zulu Campaign; was mentioned in despatches, and was granted a medal and clasp. On the 10th September, 1884, he proceeded to Egypt for duty with the Soudan Expedition, Nile Force; was mentioned in despatches and granted a medal with clasp and bronze star, and was promoted to the rank of veterinary-major for meritorious service. On the 24th February, 1894, he was promoted to the rank of veterinary-lieutenant-colonel and posted to Ireland as district veterinary officer for that country, where he served until his lamentable death.

The annual dinner of the Army Veterinary Department was held at the Hôtel Metropole on the 21st inst., when the following officers were present:—Veterinary-Colonel J. D. Lambert, C.B., Director-General; Veterinary-Lieutenant-Colonels J. H. B. Hallin, C.J.E.; G. A. Oliphant, W. B. Walters, C.B.; W. A. Russell; H. Thompson; Veterinary-Majors J. Kettle, J. Reilly, B. L. Glover, J. C. Dwyer, R. Rowe, G. D. Whitfield, J. K. Grainger; J. Burton, S. Longhurst; Veterinary-Captains T. Flintoff, R. H. Rinze, R. Pringle, T. A. Kellick, J. B. Savage, K. Lees, E. H. Kelly, L. J. Blenkinsop, F. Joslen, E. R. C. Butler, G. C. D. Fowler, D. J. Berry, E. J. Lawson; Veterinary-Lieutenant F. C. Stratton, E. J. P. Barry, W. E. Russell, F. M. Carr, and F. W. Hunt. Veterinary-Surgeons 1st Class, H. Dawson and A. A. Jones.

Extracts from Foreign Journals.

INFECTIOUS ABORTION.

THE distinguished Danish surgeon Sand read a paper recently before a meeting of veterinarians on this interesting subject, in the course of which he gave the result of observations made by forty-five veterinary surgeons. The first question on which opinions were asked was whether infectious abortion is of frequent occurence, and to this question 23 Danish surgeons replied that it was very common, 11 that it was pretty common, whilst from other parts of the country it was reported that abortion had assumed the dimensions of a veritable plague. Attention has long been directed in Denmark to the question of the origin of this pest, and the reports of the 45 surgeons show that it can be introduced into healthy herds by the purchase of cows from infected places. Attention is drawn to the fact that in purely cattle-breeding establishments abortion is scarcely known. A case is reported in which a recently purchased cow apparently introduced abortion into a stable where the plague had been till then unknown, but where it at once spread; the owner concealed his misfortune, and sent his cows to be served by the bull of one of his neighbours, whereupon abortion was introduced into the neighbour's stable, and persisted for two years. Another surgeon reported as follows: "In a certain herd abortion reached an acute stage. After the calving of a certain cow, I took a portion of the after-birth home with me, and as I had a little Jutland cow, which always carried its calf fourteen days too long, and was due to calve in four weeks, I rubbed the vagina with the piece of the after-birth; in five days my cow aborted. From this cow again another piece of after-birth was taken, and applied in the same way to another cow of little value which used to carry her calf too long, and which was destined for the butcher; she aborted in seventeen days." On the important question whether bulls can act as spreaders of infection, little is to be learnt from veterinary literature, but seven of these Danish surgeons have brought convincing proofs of inoculability by means of the bull. In one case a bull was brought to a village to serve the cows of four adjoining farms, and all the cows served by this bull aborted, as well as those from a distant farm that were brought to be served by him. In another case a bull was purchased for an estate; he was of healthy stock, but had been stabled for a day or two at a farm where abortion was the general custom among the cows; at the same time it was stated that he had not come into contact with the cows of this farm. This bull was set to serve the older cows, whilst the younger cows on the estate were to be served by a younger bull; of the older cows some 12 or 14 aborted; of the younger animals, served by the younger bull, not one! It was afterwards discovered that the older bull, before his introduction to the estate, had covered two cows from an infected herd. In this case abortion continued for two years.

With regard to the observation of pathological alterations in the genital organs, mention is occasionally made in veterinary literature of eruptions in the vagina or on the labia. From the reports of these Danish surgeons it appears that such phenomena are at any rate rare; either nothing is said about them or their existence is expressly denied. Only one surgeon mentions having treated a bull for inflammation of the prepuce, which had evidently been brought about by covering infected cows, and on the other hand he observed inflammation of the vagina take place in cows after they had been served by a bull which had previously served infected cows. One surgeon frequeutly noticed, long after abortion, peculiar nodules develop, underneath the knee-joints, outside the hip-joints, at the hocks, and at the elbow-joints and elsewhere, and those nodules contained a thin slimy liquid. Whether these had any connection with the abortion is as difficult to

determine as is the significance of the peculiar swelling of the back of the knee-joint.

The period of abortion falls usually between the fifth and the seventh month. In the earlier stages of infection and until the malady has, so to speak, reached its crisis it occurs even sooner, sometimes in the third or fourth month, and gradually declines till the normal time is again reached. This is to be explained only by the decline in the virulence of the bacteria and the increasing power of resistance on the part of the organism until complete immunity is obtained. An old experience of surgeons is likewise confirmed by these reports of the 45, namely, that late-bearing cows when purchased and introduced to an infected herd do not at first abort, but do so without exception in the second year. According to observation, heifers are the most disposed to abort and abort earliest, doubtless because pregnancy makes greater demands on them than on older animals.

Of great importance is the question whether the same cows abort year after year, and this question has received very little attention; in veterinary literature it has hardly been treated on at all. It would be in itself a possibility that infectious abortion should bequeath immunity, and this theory receives actual confirmation in as far as 28 of the 45 surgeons report that, as a rule, cows abort only two to three years consecutively. It is true one cow was observed which aborted five years consecutively; but the majority of the reporting surgeons say that the aborting lasted, as a rule, only two to three years, and if it was continued, it was continued only by the heifers and purchased cows. It thus appears that the best way to get rid of the plague of abortion is to *keep* the animals affected by it and to avoid the purchase of fresh animals. In this connection one of the 45 surgeons reports as follows: "In a herd of 60 cows in one particular year the great majority of the cows aborted; the owner sold the aborters and bought others, but in the following year *all* the new cows, and a portion of those that had been spared the first year, aborted. Once more the aborting cows were sold and replaced by others, which next year again aborted. This went on for eight years, till the owner saw that purchasing fresh stock was useless; he therefore kept the old stock, and in two years the abortion ceased." Another surgeon reports a similar case, in which by new purchases abortion was kept up for twelve years. The verification of this theory is of the utmost importance for the practical question of eradicating abortion, and the attention of all veterinarians ought to be directed to the above-mentioned facts. With regard to the economic aspect of the question, it may be said that infectious abortion is universally regarded as the worst misfortune that can befall the owner of cattle, and is almost on a par with tuberculosis. The loss consists, as is well known, in the diminution of the milk-supply and in the difficulty of maintaining the herd in existence, as well as in other annoyances. The diminution in the quantity of milk is proportionate to the earliness of abortion—the earlier this occurs the less milk is there, and the diminution is increased by the persistent retention of the after-birth. The majority of the observers speak of a reduction in the milk-supply as amounting to one-half, but it is often greater. The serious reduction in the number of calves born alive, the great mortality amongst these after their birth, and the frequency of sterility amongst the mothers as a consequence of abortion, are amongst the troubles that beset the life of the cattle-owner. One surgeon noticed that in a particular herd 50 to 60 per cent. of the cows became sterile after abortion.

The opinions of the Danish surgeons as to the best mode of treating abortion vary considerably. Sand himself declares it to be difficult to give a pronouncement on the matter, all the more because abortion generally diminishes of its own accord after two to three years, and finally dies away.

The efficacy, therefore, of curative measures will depend, for the most part, on the time at which they were applied. If, for example, the abortion has already reached its crisis when remedies are applied, the apparent efficacy of these will be naturally greater. It is wonderful to notice what an importance is still attached, even in these modern days, to superstitious remedies. In some parts of the country farmers are to be found who think that this plague can best be stopped by bringing a living goat or a dead fox into the cattle-sheds. Of scientific remedies, the most commonly applied is the subcutaneous injection of carbolic acid, as recommended by Bräuer, and the great majority of surgeons have had good results from its use. It must be remembered, however, that Bräuer recommends, along with the injections, the most careful disinfection of the external generative organs of infected animals and the thorough cleansing of the stables, and the good results may be as much owing to these measures as to anything else.

The results of the Danish surgeon's observations may be summed up as follows :—(1.) Of the infectious nature of abortion there can be no doubt; it can be conveyed from herd to herd by infected animals both male and female. (2.) It does not leave behind it immediate immunity; two to three years must elapse before this occurs, but immunity will not be obtained and abortion will not cease unless the infected animals are kept together and no additions be made to the stock by purchase; to act otherwise will only result in spreading the plague and lengthening its duration. In the course of the two or three years abortion gradually diminishes until the normal time of pregnancy is once more reached. (3.) The best mode of treatment is the careful disinfection of all walls and sheds with chloride of lime twice a year, a weekly washing down of walls and pillars, &c., and a daily cleansing of drains and gutters. (4.) Immediate separation of all animals about to abort is necessary and careful watching of same by special attendants; likewise removal of the after-birth twelve hours after the fœtus has been passed, destruction of this and of the fœtus by burying them in quick-lime. (5.) Washing out of the uterus after abortion with a solution of 1 per cent. of creolin or ½ per cent. of lysol is advised until the stoppage of the vaginal flow takes place. Cows that have been so affected must not be allowed to go the bull till two or three months have elapsed since the birth. By this means not only is the spread of infectiou stopped, but the animals generally become pregnant again. (6.) In the case of the apparently healthy cows and heifers it is recommended that the vagina be syringed (either as above or with a solution of 1 per cent. of fluid carbolic acid plus 1 to 2 per cent. Natr. Carbon.) before they are allowed to go to the bull; afterwards the external genitals should be washed daily. The penis of the bull should be syringed in the same manner.—(*Berliner Thierärztliche Wochenschrift.*)

EXPERIMENTS WITH MALLEIN AT BUDAPEST (HUNGARY).

In the stables of a large posting establishment at Budapest, where 340 horses are kept, glanders broke out some time ago, and several circumstances pointed to the probability of its having existed for some time in a latent form. In consequence of this the Mallein test was applied to all the horses and more than 100 reacted typically; these were at once slaughtered and after-wards dissected by Dr. von Raetz, Professor of Pathological Anatomy in the Veterinary College at Budapest. The dissections had to be conducted in a somewhat hasty manner, as the number of animals to be slaughtered was so great; consequently only the rougher changes caused by glanders could be looked for. Yet these changes were found in over 90 per cent. of the horses slaughtered, although these whilst in life had shown no perceptible glanders-changes, but had reacted typically. It is probable that in the remainder more or less trifling changes were present, but remained unnoticed for the

reason stated. In Budapest, therefore, as in Paris, Mallein has proved in a marvellous manner its capacity for picking out diseased animals from a herd that has been long secretly infected, and thus enabling stock owners to avoid great and unnecessary losses by a vigorous slaughter of the diseased individuals. The Hungarian Government is now convinced of the efficacy of Mallein, and intends to utilise it on a much larger scale in future. In the meantime, seeing that Mallein has succeeded in discovering the widespread infection amongst the post-horses, orders have been issued for the examination of all horses in Budapest and for the application of the Mallein-test in all stables where there is the mere suspicion of glanders.—(*Berliner Thierärztliche Wochenschrift*).

Notes and News from Foreign Journals.

A Prolific Cow.—The following case is reported from the neighbourhood of Hünfeld (Nassau). A cow produced in 1892 three calves, in 1893 the same number, in 1894 twins, and on the 9th of May this year four living calves, all of normal development and all quite lively!

Arsenic Poisoning.—Veterinary Surgeon Schultz of Idstein, says he has been in the habit of prescribing for horses troubled with worms the following, in the form of pills:—Ac. arsen. 1 gramme, Hydrarg. chlor. 4 grm. along with Radix althea (1 grm. = 15·43 grains). In one case he gave even 4 gr. ac. arsen. for three days in succession without any bad results. He was therefore unpleasantly surprised one day when he was called in to examine a miller's horse, to which had been administered only 2 grammes of arsenic but which was showing distinct symptoms of acute arsenical poisoning. The mill was remote from other habitations and nothing could be got for the horse but sugar and water, which was administered in large quantities, and in 24 hours the animal had recovered. Great caution should be observed when dealing with drugs like arsenic.—(*Berliner Thierärzt. Wochensch.*)

Another Case of Poisoning.—A strong eight-year-old mare suffered from worms. Veterinary Surgeon Kramer administered 12 grammes (=3 drms.) of Tartar Emetic and this seemed to effect a cure, but after a time the worms re-appeared. Kramer now ordered two powders each of 12 grms. Tartarus, and 4 grms. Calomel, the second powder to be given to the mare ten days after the first. By mistake the second powder was given the day after the administration of the first. Half-an-hour afterwards profuse perspiration broke out in the mare, accompanied with continuous groaning, sickness, fever, and a quickened breath and pulse. Hay and water were greedily taken by her, and red wine was administered to her day and night; she was also rubbed with spirit. On the sixth day she could stand on her feet again, and gradually she recovered the full use of her limbs, but it was a long time before she was thoroughly well again.—(*Ibid.*)

Excision of the Clitoris in a Mare.—A case is reported of a mare which used to become in the summer months so vicious, that any attempt to approach her was attended with danger. She became so bad that her owner forbade his servants to use her, on the supposition that it was a case of degeneration of the ovaries. When left to herself, the mare kept continually lashing her flanks with her tail. A surgeon was called in but would not hear of ovariotomy, which the owner wished him to perform; instead, he recommended excision of the clitoris. The mare was cast and narcotised, and the clitoris was removed with the aid of a thermocauter. Two days afterwards the mare allowed anybody to approach her; the wound could therefore be treated without any difficulty. A few days later she was ready for work and could be employed in any kind of service—(*Ibid.*)

Notes and News.

THE Cruelty to Animals (Scotland) Act, 1850. An amended Act has lately been passed, in extension of the above Act to the following effect. The definition of the word "Animal" in section 11 of the recited Act shall be amended by adding at the end thereof the words "or any game or fighting cock, or other domestic fowl or bird," and every person who shall in any manner encourage, aid or assist at any cock fight, whether in a place kept for that purpose or otherwise, shall be guilty of an offence under the said Act.

THE PROPHYLACTIC PROPERTIES OF ANTI-TETANIC SERUM.—M. Vaillard has rendered useful service in reminding the profession of the marked prophylactic properties of anti-tetanic serum employed hypodermically. The serum is now acknowledged to be powerless to counteract the virus once the disease is declared in an acute form. When, however, the evolution of the tetanus is slow, the injections, associated with removal of the tissues primarily inoculated, increase the chances of recovery. But it is as a prophylactic agent that the value of the serum is conspicuous. Injected into animals it renders them quite immune against the toxine. This immunity is only temporary, lasting from two to six weeks, according to the dose employed. But successive injections may be had recourse to without inconvenience. Certain and complete immunity is further conferred on animals into whose areolar tissue the virus has been introduced, but a like happy result cannot be predicted with certainty when the poison has been introduced into the thickness of a muscle. This is explicable enough when one considers that it is to phagocytosis that we must look for the successful destruction of the virus, and that this process is always rudimentary in the muscle, whereas in the subcutaneous tissue it is most active. The injection of the serum as a preservative is, therefore, called for in individuals who have met with traumatisms which, from their situation, their nature, and the circumstances attending their infliction, are known commonly to lead to tetanus (contused wounds contaminated with soil, dust, dung, or river mud; wounds complicated with entrance of foreign bodies that have been in contact with the soil). The employment of the serum is again indicated in animals that have undergone operation known to favour the *éclosion* of tetanus (castration, tail-amputation, and operations on the hoof). M. Vaillard tells us that the preventive use of the serum is destined to render immense services to the inhabitants of tropical countries, where tetanus is so apt to supervene on trivial injuries as to constitute one of the principal causes of death amongst the natives. The serum will be specially applicable in certain northern countries of Europe where tetanus of the new-born is responsible for as much as 60 per cent. of infant mortality. Again, what a prospect of salvation does the employment of the method hold out in military surgery in time of war. In veterinary practice thousands of valuable lives may thus be saved. Already Professor Nocard has inaugurated this preventive treatment, and the injections have been in the hands of several veterinary surgeons the means of arresting the disease after such operations as castrations and such injuries as penetration of a nail into the hoof. Who would, twenty years ago, have prophesied that tetanus would be converted into what it actually is —a preventable disease?

EXTRACT FROM THE ANNUAL AGRICULTURAL REPORT OF THE BRITISH CONSUL, BOSTON, UNITED STATES, REGARDING TUBERCULOSIS.

A VERY determined effort is being made in Massachusetts to stamp out tuberculosis among cattle. The subject is one of very great interest, not only

to this State and country, but to the world in general, as Massachusetts has always been in the van of progress in matters of this sort, and may be relied upon to carry out the experiment it has undertaken without stint in regard to expense, and with a judicious mingling of energy on the part of those charged with carrying out the regulations, and regard for the interests of those affected by the provisions of the law. The Act under which the experiment is being made, only came into force on the 20th June last, and the first report of the Board of Cattle Commissioners, acting under it, has just come out, and I have forwarded copies of it to the Foreign Office, where, no doubt, it will be made available to the public or to those interested in the subject.*

I think, however, that a short notice of it will not be out of place in the present report.

Previous to the passing of the above-mentioned Act, although cattle inspectors existed throughout the State, their duties were somewhat vague, and more of a permissive than an obligatory nature. From the passing of the Act, however, the law compels all cities and townships to provide inspectors, and these are put under the control of the Board of Cattle Commissioners, whose number is increased from three to five members, and who have considerable powers, and very arduous if interesting duties. The inspectors are 394 in number, and are under the control of the Board, though appointed and paid by the cities or townships. Their duties are to inspect all animals, and quarantine those that appear to them affected with any contagious disease. They have also other duties connected with the inspection of all butchered cattle, but these need not here be specified. They have no authority to remove a quarantine once imposed, that power being reserved to the Cattle Commission. Prior to October 4th, the existence of contagious disease in animals was determined by the Commissioners by physical examination, but since that date, the Commission has adopted the uniform rule of subjecting all animals suspected of being affected with tuberculosis, to the tuberculin test. This test is not applied by the inspectors, but by the Commissioners themselves, or their own direct agents and assistants, of whom, up to December 15th, 33 had been appointed.

The test is applied as follows:—A sufficient number of preliminary examinations are made with the clinical thermometer, to ascertain accurately the normal temperature; these examinations being made at, as nearly as possible, the same time of day in all cases. The normal temperature having been ascertained and recorded, the injection of tuberculin is made in the evening. Eleven hours after the injection, the trial temperatures are taken and recorded. These are taken every two hours until the test is finished. The time required to properly complete this part of the test varies considerably; it may be roughly stated at from six to 30 hours, with an average of about 12 hours. The Commissioners, in their report, state that the reaction caused by the tuberculin is so plainly marked in most cases, under the usual conditions, that the animal may be condemned or released with absolute certainty, provided that the necessary care has been observed in making up the tables of temperatures. The animals which pass the examination are branded as sound. Those condemned are, in all cases, dissected and further examined, as, under the Act of 1894, the owner receives full value as compensation should dissection not confirm the diagnosis arrived at by the tuberculin test; whereas, if correct, he receives "one half the value thereof at the time of slaughter for food or milk purposes, and without taking into consideration the existence of disease."

Provided always, however, that the animal has been within the State continuously six months prior to its being killed.

* Forwarded to Board of Agriculture, May 3rd.

This question of compensation gave rise to very great discussion when the Act passed, and has been still more hotly debated since. Previous to June 20th, 1894, no compensation whatever was paid for an animal slaughtered in consequence of having been found to be affected with any contagious disease; now, on the contrary, the views of the legislature have so far altered that, not content with the compensation allowed by the Act of 1894, a fresh Bill has been brought in, and at the time of writing this report has passed through almost all its stages, which contemplates paying no longer the half, but the entire value of animals slaughtered under this Act. Under the old law of 1893, the Commission slaughtered, as tuberculous, 529 animals, for which no compensation at all was paid. Since the passing of the Act to the end of 1894, the new Board of Commissioners have sanctioned payment for 810 cattle, condemned and destroyed as tuberculous, in a total sum of 15,280 dol. 15 c. (about £3,050), or, on an average, at the rate of £3 15*s.* 2*d.* each; that being half the estimated value of the animals at the time they were killed, "for beef or milk purposes."

It may here be interesting to note the practice in regard to compensation in the other States comprised in this consular district.

Maine relies upon the owners reporting cases of tuberculosis, and does not make any systematic inspection of the animals in the State, but under an Act passed in 1893 the Cattle Commissioners are authorised to destroy animals found affected by infectious or contagious diseases, and to pay the owners "one half of their value as determined upon the basis of health before infection." With a proviso, however, that no compensation is allowed if the beast has been exposed to infection ontside the State, or has been brought into the State within three years previous to its showing evidence of such disease.

The law in New Hampshire is the same except that instead of three years the limit of time is three months.

In Vermont a new law was passed as lately as November 27th, 1894, which fixes the compensation to be paid, as in the other two States, at one half the value "on a health basis," and the limit of previous residence at six months, but has this curious limitation with regard to using a tuberculin test, namely, that it may not be used without the owner's consent in the case of any animal owned and resident in the State, but it may freely be used on cattle imported from outside the State if quarantined on suspicion of disease.

Returning to the powers and duties of the Cattle Commissioners in Massachusetts: the system established by the Board meeting, held on October 4th last, embraced the following points:—

1. The test, with tuberculin, of all suspected cases reported by the local inspectors.
2. The regulation of the importation of all meat stock into the State.
3. The quarantine of all imported animals unless tested with tuberculin, and either condemned or certified as sound.
4. The establishment of regular quarantine stations.
5. The forbidding of all importations of neat stock, unless delivered at these stations.
6. The branding of all animals that pass the tuberculin test.
7. A systematic examination, by the use of tuberculin, of all animals within the State—beginning with the three southernmost counties.

These resolutions only came into full effect on November 25th last, and the amount of work got through with since is little short of marvellous.

I may mention that the inoculation is entrusted exclusively to veterinary surgeons; the inspectors, as above stated, having nothing, as such, to do with the tuberculin test.

The tuberculin used is exclusively prepared at the United States Laboratory at Washington.

These few notes may serve to show the scope of the work being done by the Massachusetts Board of Cattle Commissioners, but I strongly recommend those interested in the matter to refer to the report itself, of which, as I have said, I have sent some copies to the Foreign Office, and could obtain more if required through the courtesy of the Chairman of the Commission.

Correspondence.

C. on M., Manchester,
May 12th, 1895.

To the Editor of the Veterinary Journal.

Dear Sir,—Would you oblige by inserting enclosed? I could send you all Professor G. T. Brown's letters and mine, but they would occupy too much space. I warned him that it was probable that I should make use of them publicly.—Yours truly, W. G. R. A. Cox.

VETERINARY INSPECTORSHIPS AND THE BOARD OF AGRICULTURE.

Sir,—We hear a good deal about our social and professional improvement, and not the least prominent amongst those who profess an anxiety for its continnance and rapid progress are the teachers at our schools. In one of them an individual, who owes more to the profession than the profession does to him, we have had an apt illustration of the real feelings that actuate many of these toward the body corporate. It is scarce necessary to say that subordinate to the Board of Agriculture is a Veterinary Department, having its staff of inspectors who are appointed to supervise and control, or suppress contagious disease. The chief of the Veterinary Department was, until some time ago, Professor G. T. Brown, and there can be no doubt that he was the main, if not the only, factor in the appointment of inspector. He is anxious for our social elevation and he shows it by giving an important position—Head of the Diseases of Animals' Department—to a military officer, and by the appointment of about 30 subaltern inspectors who are not vets., and know nothing of disease. It is useless to attempt to wriggle out of this as it is on record.

It might puzzle some of us to solve the motives for such action. We can only surmise that the idea of thoroughly experienced *practical* inspectors is obnoxious to the powers that be, lest they should distinguish their lack of diagnostic acumen that it may be safely said has been painfully illustrated in the past. To what shame and reproach have they exposed us by soliciting, like beggars at a gate, an endorsement of their statements by continental *confrères*, who, although their friends, would not commit themselves. Take a more recent instance where unable to decide. A portion, said to be pleuro-pneumonia lung, was submitted to a microscopic expert not at all experienced in the morbid anatomy of that malady. A practical expert could diagnose a case better without the microscope than they can with it.

Quite recently anthrax has appeared in Leicestershire, and replying to the County Council this sapient Department, say they "have no veterinary officer that they can send down," and this we can quite believe, when in a letter written to me, Professor G. T. Brown says, treating of travelling inspectors, "they have no veterinary duties to perform." What upon earth are they for, and why the expense when the burials, disinfection, and other minor matters are done by the police? The nature of the malady being affirmed by the

local veterinary surgeon, perhaps the learned gentleman will give us an idea of what is his notion as to the courtesy due from him to us.—I am, yours obediently,

W. G. R. A. Cox.

HOUSE OF COMMONS,
May 23rd, 1895.

To the Editor of the VETERINARY JOURNAL.

DEAR SIR,—As the question of the organisation of the late Veterinary Department of the Board of Agriculture, now called the Animals' Division, is one in which I take a special interest both from a public and professional point of view, I should be much obliged if you would, with a view to strengthening my arguments, write to me your opinion thereon. It appears to me that the veterinary profession have good cause of complaint of the action of the Board of Agriculture in abolishing the post of director and thus depriving them of a position to which they were fully entitled by reason of the valuable services which they have rendered in the past to the State, and it is my intention on the estimates to raise the whole question in committee.—Yours faithfully,

HUDSON J. KEARLEY.

HOUSE OF COMMONS.
May 30th, 1895.

Mr. Kearley presents his compliments to the Editor of the VETERINARY JOURNAL, and thinks it may be of interest to the profession to know that he has given notice of a reduction, in supply, of the vote for the Board of Agriculture, in order to enable him to call attention to the change of policy in the Veterinary Department in failing to appoint a veterinarian to the vacant post of director, reducing the number of the scientific officers in the Department, and in renaming it the Animals' Division.

NEW VETERINARY COLLEGE, EDINBURGH,
16th June, 1895.

To the Editor of the VETERINARY JOURNAL.

SIR,—Permit me through your valuable JOURNAL to thank the members of the profession who supported me at the recent election of members of Council.

I consider it a very great honour to have been re-elected, as it seems to point out that after a year's trial a large number of the profession have so much confidence in me.

It will always be my endeavour to promote and protect the interests of the profession.—I remain, Sir, your obedient servant,

W. OWEN WILLIAMS.

Communications, Books, Journals, etc., Received.

Messrs. J. and A. Churchill; Dr. Bruno Galli, Valerio, Milan; J. Washington Irving, M.R.C.V.S., Brisbane; Joshua A. Nunn, F.R.C.V.S., C.T.E.; Prof. T R. Fraser, M.D., F.R.S.; E. Wallis Hoare, F.R.C.V.S., Cork; Veterinary Department, Privy Council, Dublin Castle; W. Owen Williams; J. P. Duncan, Esq., M.D.; E. W. Anderton, Esq.; R. Elliott, Esq.; "Hirudo"; M. J. Cleary, Esq.; Glasgow Veterinary College; H. J. Bowes, M.R.C.V.S.; "The Veterinarian"; "The Veterinary Record"; "The North British Agriculturist"; "The Board of Agriculture," London; Army Veterinary Department; A. W. Hill, Esq.; "American Veterinary Review"; Dr. A. J. Haslam; "The Cape Agricultural Journal"; "The Times of India"; "Recueil de Médécine Vétérinaire"; La Presse Vétérinaire (Paris); Annales de Médecine Vétérinaire (Brussels); L'Echo Vétérinaire (Liége); Berliner Thierärztliche Wochenschrift (Berlin); Topographische Anatomie der Körperhöhlen des Rindes, von Dr. Reinold Schmaltz (Berlin: R. Schoetz); La Gran Revista Argentina (Buenos Aires); Letter from Eugen Bass, veterinary surgeon, Graetz (Posen).